TECHNOLOGY DEPT.

December, 1953

Telephone Engineer and Management

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THE NATIONAL TELEPHONE MAGAZINE

Featuring In This Issue—

★ MODERN CARRIER EQUIPMENT, *by E. G. Hall*
★ TRANSISTORS AND THEIR APPLICATIONS, *by R. P. Dimmer*
★ THE LITTLE WHEEL, *by Ruth E. Richards*
★ CABLE PLANT CONSTRUCTION, *by John S. Reed*

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TELEPHONE ENGINEER & MANAGEMENT

The National Telephone Magazine • Vol. 57, No. 12, December, 1953

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1052 W. 6th St., Los Angeles, Calif.

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FRONT COVER: President Eisenhower tries out the nation's 50-millionth telephone, presented to him Nov. 18, 1953, by the telephone industry at a brief ceremony at the White House in Washington, D. C. Participating in the ceremony were Cleo F. Craig, president of the American Telephone & Telegraph Co., Warren B. Clay, president of the United States Independent Telephone Association, Rosel H. Hyde, chairman of the Federal Communications Commission, and C. L. Doherty, president of the National Association of Railroad and Utility Commissioners. Shown with President Eisenhower are, left to right in foreground: Mr. Doherty, Mr. Clay and Mr. Craig. Mr. Clay is holding a scroll that was also presented to President Eisenhower designating his new telephone as the 50-millionth in the nation.

INDEPENDENT TELEPHONES SERVE 2/3 USArea

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To those of you who attended the USITA national convention, the above display will look familiar. We are pleased to acknowledge your many favorable comments.

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CARRIER
Subscriber and Trunk

FM the proven system for noise-free transmission

- Constant audio output over varying transmission losses. Toll quality up to 55 db line loss without pilot channel control.
- Greater noise rejection than conventional AM carriers . . . noise level never exceeds audio level.
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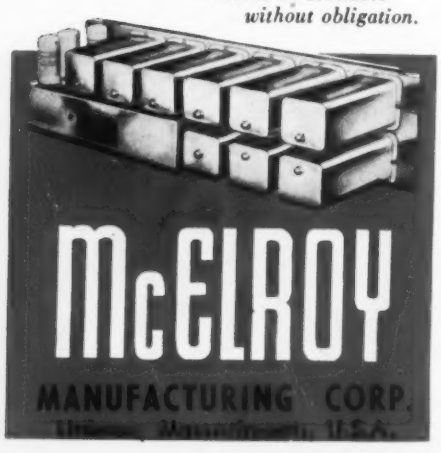
Draw a rough sketch of your telephone system showing your plans for expansion and mail to us. Chances are we can show you how to save considerably by the use of type "S" carrier . . . the carrier your system can afford! Our engineers are paid to increase your revenue and cut your costs. Thirty years of communications experience is available — without obligation.



McELROY
MANUFACTURING CORP.

Mostly About People—

Across The Editor's Desk

50-Millionth Telephone

IT WAS OUR pleasure to be in Washington D. C. when the 50-millionth telephone was presented to President Eisenhower on Nov. 18. We attended the banquet that evening commemorating the event. Your Editor felt much like *Roy Siemund*, who was seated at our table, as he turned to me and said, "Ray, this occasion is so impressive that something inside me wells up with pride over our industry — I have a warm feeling all over." It was that and more as we Independents sat and listened to our spokesman, *Warren Clay*, and to president *Cleo Craig* of the A. T. & T. Company. You will find the details of this outstanding event in this issue.

Worthington's Good Neighbor

THIS issue, mailed to you just 10 days before Christmas, also has another feature we are indeed proud of. "*Worthington's Good Neighbors*" on page 72 takes you behind the scenes of one of Independent telephony's young executives who has brought Santa Claus to every child in his area. The story of the *Cashel* family of Worthington, Minn., will interest you and prove most informative. *John Withy* is the author whom we commissioned to prepare this timely article.

The Transistor

MANY OF OUR readers have been avid readers of every word and line they could find about transistors and their applications. This year an article was written by *Robert P. Dimmer*, project engineer, Automatic Electric Co., Chicago, to be presented before the Western Society of Engineers and later reproduced in their magazine THE MIDWEST ENGINEER. This paper was such a thorough and complete treatise that we requested the right to reproduce it in this publication and in this issue.

State Conventions

ONE OF THESE days we hope to be able to attend each and every one of the telephone conventions held in the Southeastern states during the Fall of each year. Unfortunately we have never had that pleasure but have accomplished the next best by attendance of each of them at some time. This year we were unable to make the conventions in that area with the exception of the Alabama-Mississippi, Florida and Georgia meetings that were held in succession and just before the Washington banquet mentioned in the lead paragraph of this column.

Florida Trip

WE PARTICULARLY enjoyed the one weekend on this trip that brought a number of telephone folks together for what could have been a very lonesome two days. It was far from lonesome as *Carl Brorein* of Tampa and his son *Carl Jr.* took particular pains to make it most enjoyable. At the adjournment of the Florida convention the Broreins arranged for the following to explore the interior of Florida: "*Cap*" *Henry*, Bellevue, Ohio; *Ted Gary* and *Rupert Shotts* of Chicago; *Art Gibson* and *Tommy Thompson* of Rochester, N. Y.; *Paul Rhoads* of Atlanta and the *Editor*. As spokesman for the group we extend a sincere thank you to the *Broreins*.

Merry Christmas

THE ENTIRE Staff of the *Telephone Engineer* publications join with me in wishing our readers and friends all the *Joys* of a *Happy Holiday Season*.

Exide-Manchex
BATTERIES

EXCLUSIVE Positive Plate showing lead button construction—rolled strips of corrugated lead, which are pressed securely into holes of the grid.
Only a small portion of the total lead in buttons is formed initially into active material; the remainder is available for gradual conversion in service.

FOR LOW COST, DEPENDABLE OPERATION

in every type of telephone service

Service records prove the *extra* long life, *extra* low maintenance costs, *extra* power of Exide-Manchex batteries. There's a size and type for every application in telephone operation . . . for central office and private branch exchange equipment . . . for other applications requiring a reliable source of power.

Exide-Manchex batteries offer better service . . . longer life, for these reasons:

POSITIVE OPERATION: Dependable performance for all telephone exchange requirements.

ADEQUATE RESERVE POWER for emergencies beyond normal needs.

LOW OPERATING COST: Extremely low internal resistance.

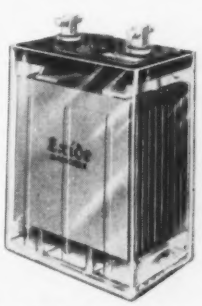
LOW MAINTENANCE COSTS: Water required about once a year. No change of chemical solution needed during life of battery.

LOW DEPRECIATION: Sturdy, long-life construction, which includes the exclusive manchester positive plate.

GREATER CAPACITY in a given amount of space avoids overcrowding of equipment.

★ ★ ★

Various sizes and types of Exide Batteries are available in plastic containers.



Exide-Manchex is your best battery buy for all telephone services

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 2 • *Exide Batteries of Canada, Limited, Toronto*

"Exide" and "Manchex"
Reg. T.M. U.S. Pat. Off.

1888 . . . DEPENDABLE BATTERIES FOR 65 YEARS . . . 1953

Reilly

CREOSOTE OIL

Will Save You Money

No matter how you look at it . . . longevity . . . replacements . . . initial cost . . . use your own method of cost accounting and you'll find that Reilly Creosote will *cost you less per year of use* than any other wood preservative. Reilly Creosote Oil has a record of over fifty years of protection . . . in alkaline and acid soils all over the country . . . in fresh or salt water.

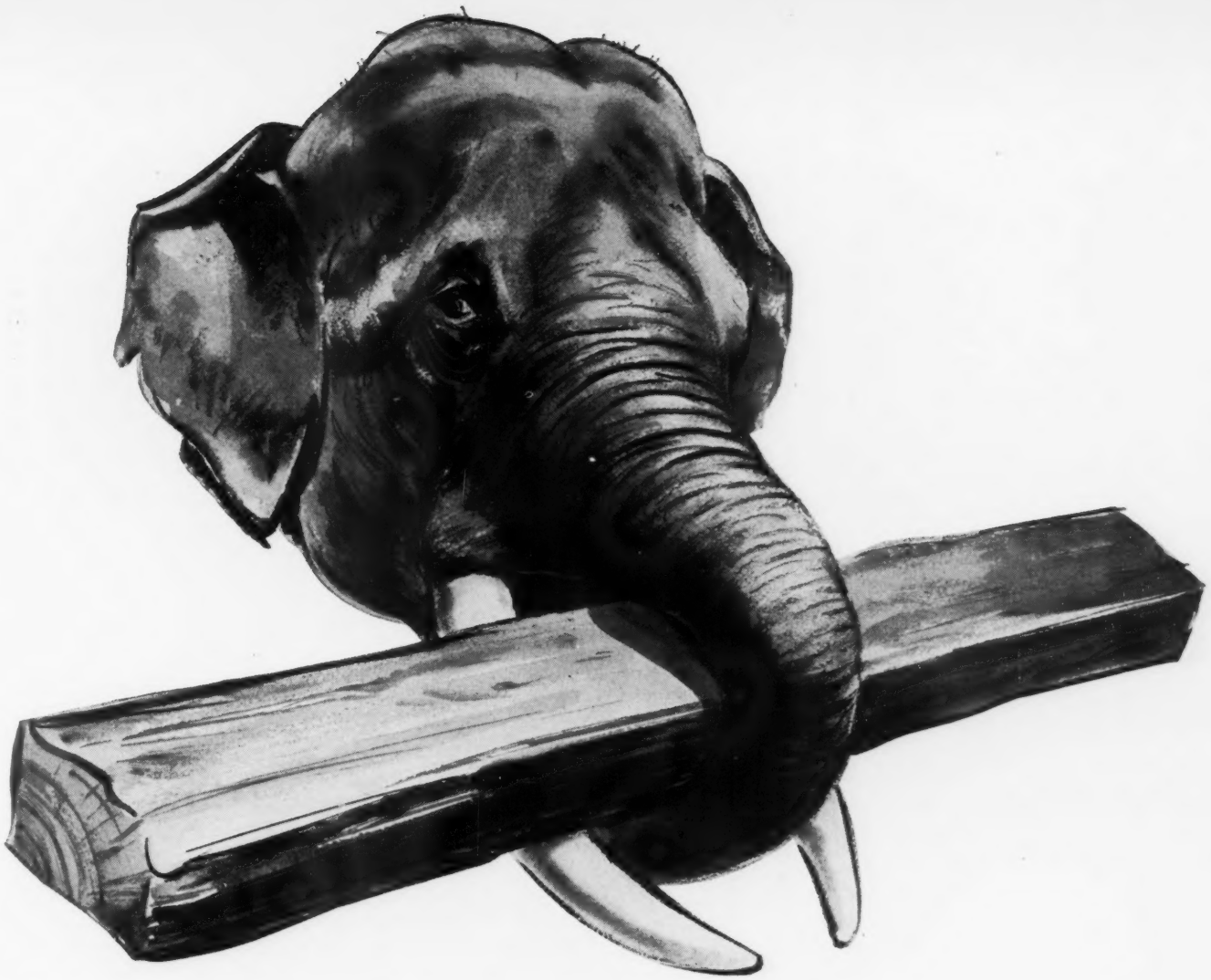
Yes, you can rely on Reilly's time-tested Creosote Oil to give the lowest cost protection under every conceivable service condition.

Remember . . . time will not tell on wood treated with Reilly Creosote.

Reilly
COAL TAR PRODUCTS

REILLY TAR & CHEMICAL CORPORATION

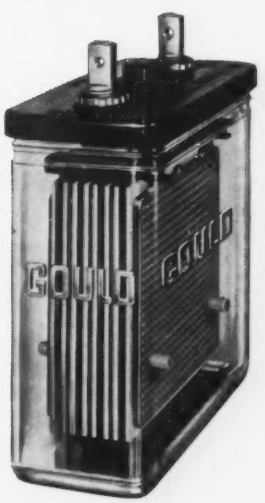
MERCHANTS BANK BUILDING
INDIANAPOLIS 4, INDIANA



RESERVE STRENGTH For Emergencies

THANKS TO BATTERY POWER!

All standby batteries are *not* alike. Gould Planté is different. It is the only battery available today with positive plates of pure lead—plates that enable the battery to renew itself as it floats. Whether you need a powerful surge or a steady flow, Gould Planté has abundant power in reserve, ready for emergencies today, tomorrow or years from now.



Specify
THE GOULD PLANTÉ
The Aristocrat of
Stationary Batteries

GOULD *INDUSTRIAL BATTERIES*

GOULD-NATIONAL BATTERIES, INC., TRENTON 7, N. J.

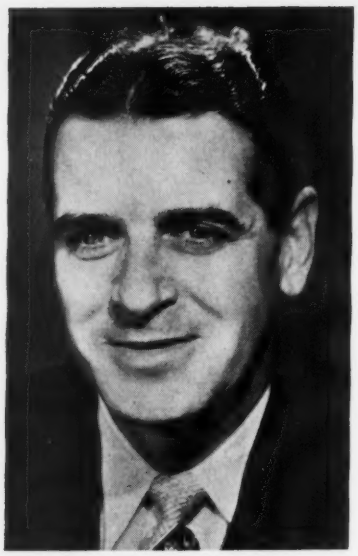
Always Use Gould-National Automobile and Truck Batteries

©1953 Gould-National Batteries, Inc.

TELE-VIEWS

CLARENCE A. MARTIN, formerly with New Jersey Bell Tel. Co., has joined General Tel. Co. of the S. W. as general traffic sup't.

J. L. RUNKLE, out-going president of the North Carolina Independent Telephone Assoc. presides over business sessions at 22nd annual convention.



R. PARKER SULLIVAN has been named operating vice pres. of General Tel. Co. of the S. W. Sullivan had been general traffic sup't.

At one of the Arkansas convention's several workshops, MRS. LEARUE FRUNK, staff assistant with Southwestern Bell, demonstrates proper switchboard technique for maximum efficiency

Record breaking sales of flashlights and batteries are following close on the heels of the "Sellology" course which the Ray-O-Vac Co. recently conducted at its national sales conference in the halls of the University of Wisconsin, Madison. J. A. McILLNAY, vice-president for sales, states that the conference was unquestionably the most successful in the long history of the organization. These photos, taken during conference show: (above) Mr. McIllnay presenting new Ray-O-Vac Hunter lantern, and (below) V. BEN BENSON leading discussion in "Sellology."

Relaxing in card room of Carolina Hotel prior to special interior decoration program for the ladies attending the 1953 convention of the North Carolina Tel. Assoc. are (l. to r.):—Mrs. R. C. LAKE, MRS. CARSON I. SIMMS, MRS. L. M. RABY, MRS. DICK FOWLER, and MRS. J. S. DAY.

NEWSLETTER
TELEPHONE ENGINEER

Fortnightly TELEPHONE ENGINEER ★ TELEPHONE ENGINEER AND *Management*

ON THE 1st OF EACH MONTH ON THE 15th OF EACH MONTH

BIG EXPANSION YEAR AHEAD. Annual construction forecast released last month by U.S. Labor & Commerce Depts. shows 1954 will be another record breaking construction year for nation's telephone & telegraph industries. Forecast pegs 1953 telephone & telegraph construction at $600,000,000 & estimates 1954 construction will total $625,000,000, up 4 per cent.

BUSINESS WEEK RUNS STORY ON INDEPENDENTS. Nov. 7 issue of McGraw-Hill's big & popular "Business Week" (B.W.) featured article titled "Independents Take A Bigger Slice." Story pointed out that although most city dwellers think "Ma Bell & her Children" serve U.S. on exclusive basis, 65% of nation's geographic area is served by 5,300 Independent telephone companies. Concentrating on growth of General Tel. Corp., article stated General has been growing since World War II at faster rate than AT&T in number of telephones served. Stating General isn't only Independent out of "Dad & Mother class," B.W. article pointed to Rochester (N.Y.) Tel. Co., Peninsular Tel. Co., Tampa, Fla., Telephone Bond & Share Co. & United Utilities, Inc. Article makes good reading. If you missed it, ask Business Week, 330 W. 42nd St., New York, N. Y. for tear sheets.

BOOKLET EXPLAINS LIVING COST INDEX. Consumer price index, yardstick used to measure effect of price change on purchasing power for urban families & workers, is explained with minimum of technical language in "A Layman's Guide to the Consumer Price Index," important new publication released by U.S. Department of Labor. Wage escalation clauses are based on this index. This 34-page booklet tells how consumer price index is compiled, why it becomes periodically necessary to revise it & what its uses & limitations are. Booklet may be purchased for 20 cents by writing U.S. Dept. of Labor, Washington, D. C.

UNITED UTILITIES UPS DIVIDEND. Earnings per average share outstanding of $1.29 for first 9 months of this year, compared with $1.10 in same period of 1952, were reported last month by United Utilities, Inc. Net operating income was up sharply to $2,551,000 from $1,641,000 in Jan.-Sept., 1952. Income available for common stock dividends & surplus was $1,348,000, against $876,000 last year.

IMPROVEMENT PROJECTS SET FAST PACE. Conroe (Tex.) started construction of $65,596 telephone building. Exchange will be converted to dial in Aug., 1954 . . . Farmers Mutual Tel. Co., Clarinda, Ia., preparing for dial conversion. Cost of project is $275,000 . . . West Coast Tel. Co. will start construction of $75,000 exchange building near Lynwood, Wash. . . Stockton Tel. Co., Cassadaga, N. Y. started construction of new exchange building. Company will convert to dial in 1954 . . . Rochester (N.Y.) Tel. Corp. announced plans to spend $9,650,000 for new construction in last four months of '53 and during '54 . . . General Tel. Co. of Calif. planning construction of new general office building at Santa Monica.

Please Turn To Page 16

Do You Need the Professional Touch?

Sure, you can get along with a "home-cooked" telephone directory. But are you taking full advantage of the potentialities of your operating area in advertising revenues? Is your directory an asset or a liability in public relations? Are you satisfied with your showing in "multiple listings?" If the answer is "no" to any of these questions, call Loomis for the professional touch.

KNOW-HOW TO SOLVE YOUR DIRECTORY PROBLEMS

"*Where to Call*"

● 724 cities and towns in 22 states are served by the 287 directories that retain Loomis services.

LOOMIS ADVERTISING COMPANY

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ST. LOUIS, MO.
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KANSAS CITY, MO.
810 Baltimore . . . HArrison 1270

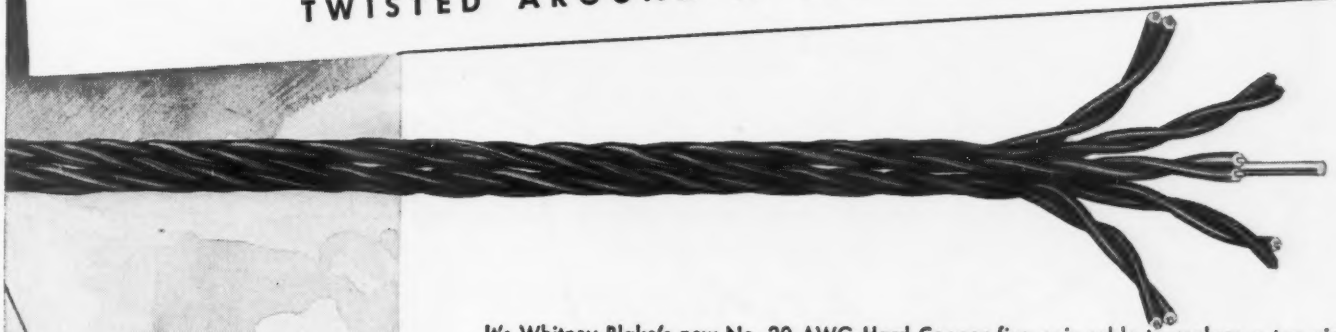
UPPER DARBY (Phila.), PA.
6908 Market St. . . . ALlegheny 4-3763

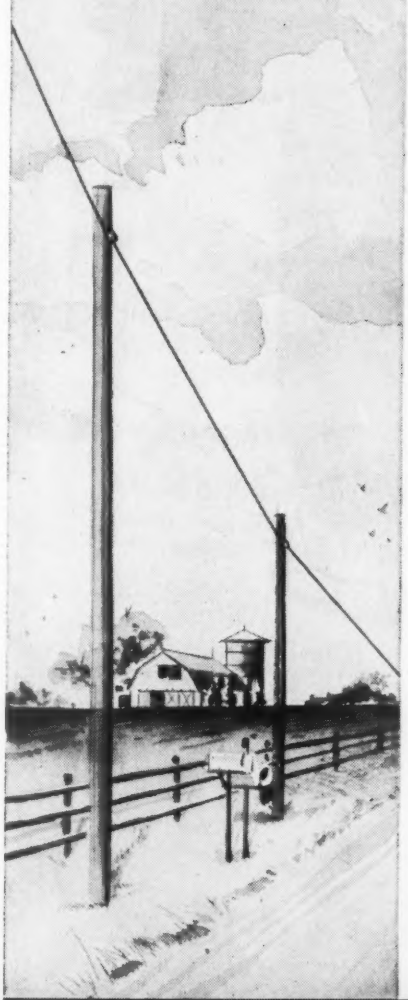
OMAHA, NEBR.
Omaha Nat'l Bank Bldg. . . . ATlantic 0188

Introducing...

NEW RURAL DISTRIBUTION CABLE

FIVE NEOPRENE JACKETED PAIRS TWISTED AROUND A STEEL CORE





It's Whitney Blake's new No. 20 AWG Hard Copper five pair cable to replace a ten pin crossarm with five pairs of open wires for rural telephone distribution.

Now you can make new installations without using crossarms and increase existing pole line capacity without adding new crossarms.

ADVANTAGES OF THIS NEW DESIGN INCLUDE:

Low initial cost — low installation cost.
Excellent electrical characteristics — Crosstalk greater than 60 decibels down per mile.
Light weight — can be attached to pole or under side of crossarm.
Small diameter.
High strength — breaking strength approximately 1800 pounds.
Easy to splice.
Readily accessible for addition of new stations.
Can be used on crowded poles where new crossarms cannot be added.
Serves as multiple drop wire to small apartments or business establishments.

GENERAL CONSTRUCTION

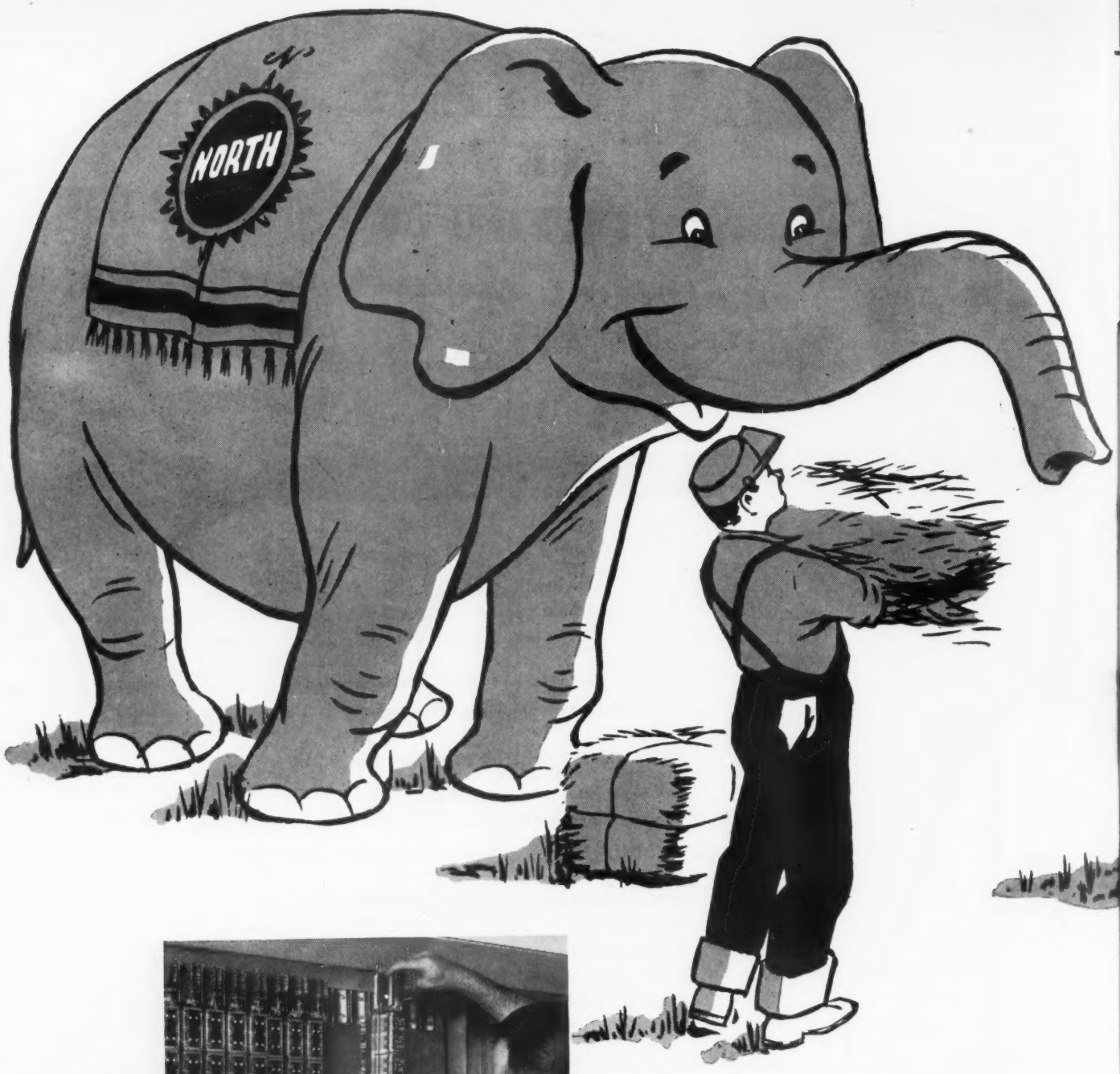
No. 20 AWG hard copper conductors with Teleplate® process — Brass-over-lead plating to assure lasting good adhesion. High dielectric strength Buna S synthetic rubber insulation. Tough neoprene jacket to a nominal outside diameter of .130". Adjacent pairs twisted with varying lays to avoid crosstalk. One conductor of each pair has raised double ridge for polarity identification. Five pairs twisted around a core of high strength galvanized steel having a breaking strength of approximately 1800 pounds. Approximate cable O.D. .600".

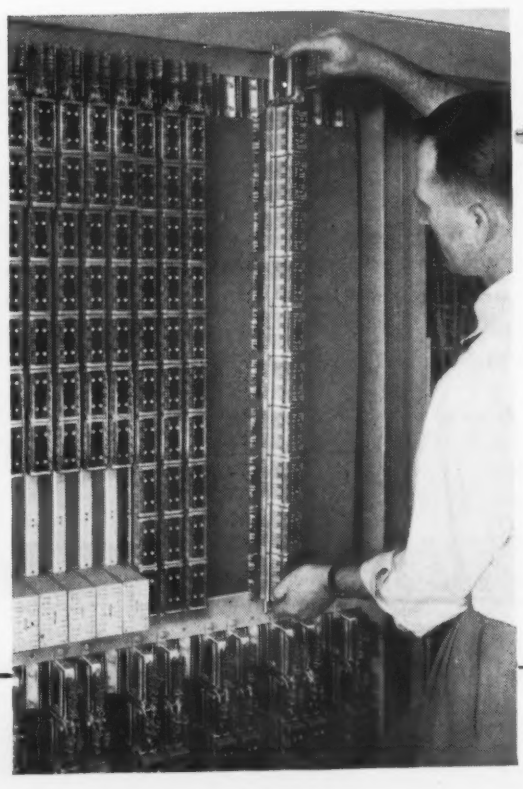
If you've ever pondered how to make existing pole line facilities do more work you need Whitney Blake Five Pair Rural Distribution Cable. Order some and see how it can reduce your outside plant costs.

WELL BUILT WIRES SINCE 1899

WHITNEY BLAKE COMPANY

NEW HAVEN 14, CONNECTICUT


NORTH



Adequate "Trunking"

...for any load

Time was when an exchange with 10% trunking was adequate in almost any community to handle any traffic its subscribers would throw at it, barring extreme emergencies. But communities change. Their pulses may quicken with new business to the point where a 10% system gets high blood pressure for sure, unless it is designed for growth. Progressive engineering keeps North "All-Relay" in step with changing characteristics of the nation's voice. Simplified methods of adding linkage enable you to stretch line equipment to its maximum usefulness. Without having to install elephantine equipment to handle peanut traffic, you still can reach out for the big stuff —if and when: Let a North Engineer show you why

NORTH *"All-Relay"* SYSTEMS

Are As Expandable As Your Needs

THE NORTH ELECTRIC MANUFACTURING COMPANY

Originators of ***ALL RELAY*** *Systems of Automatic Switching*

655 South Market Street, Galion, Ohio, U. S. A.

This theater is never . . .

snowed under with calls for program information!

In theatres and drive-ins, Peatrophone telephone-answering service is being enthusiastically accepted by theatre managers as the perfect solution to two of their most troublesome problems. Not only does Peatrophone leave their key personnel free for important duties during rush hours — but it also does an excellent public relations job, giving out program information that is accurate, clear. and packed with enthusiastic sell.

For the first time, theatre management can be certain that answers to calls for program information are delivered exactly in the form desired — *because the manager himself can record the story of each new program in a matter of minutes* — and the Peatrophone will answer every call, giving the 1000th caller the same courteous, enthusiastic answer as the first. One recording will cover an unlimited number of calls! Best of all, this wonderful service costs the theatre only a few cents a day on the phone bill.

Telephone companies who are handling this ingenious and helpful device, are finding Peatrophone's popularity rewarding — IN THE FORM OF A STEADY NEW SOURCE OF INCOME FOR THEIR COMPANIES. Write today for complete information and literature on Peatrophone — your new source of income.

Note: Selective harmonic ringing subsets now available — — all frequencies.

TELEPHONE ANSWERING & RECORDING CORP.
342 Madison Ave. New York 17, N. Y.

In any **MODERN** switchboard installation–

Photo courtesy of Stromberg-Carlson

the choice is **ACCURATE AUTOMATIC TOLL TIME CALCULATING AND RECORDING**

by **CALCULAGRAPH**

Because they quickly save many times their initial cost, CALCULAGRAPH permanent printed records eliminate switchboard detail work, speed service. Accuracy-to-the-second permits collection of all the revenue due on every call. CALCULAGRAPHS are precision instruments featuring high visibility dials, smooth silent lever action. Available in several models, they can be engineered into new equipment by your switchboard builder or easily included in your present set-up. For complete information just call or write.

CALCULAGRAPH COMPANY

HARRISON • NEW JERSEY

THE STANDARD OF ACCURACY SINCE 1892

(Continued From Page 9)

RURAL CO-OP ACTIVITY INCREASES. Here is latest rundown on rural co-op activities: Niobrara Electric Assoc., Lusk, Wyo., aiding formation of telephone co-op to serve Niobrara County. Group, headed by C. A. David, plans REA loan application . . . Directors of James Valley Tel. Co-op., Groton, S.D., approved $1,217,000 REA loan contract. Co-op Pres. Kenneth Holum said co-op will serve 2,000 subscribers . . . Adams Tel. Co-op, Mendon, Ill., reports 900 applicants for service. Directors are: Howard Hemming, Warsaw, Ill.; Edwin Wollbring, Sutter, Ill.; LeRoy Grimes, Ursa, Ill.; Bert Bellamy, Mendon.

MINNESOTA BORROWER GETS SECOND REA LOAN. November was busy month for REA's telephone loan department. Garden Valley Tel. Co., Erskine, Minn., received 2nd loan of $1,935,000, raising its total allocation to $4,000,000. Other supplemental loans included: $245,000 to New York State Tel. Co., Roosevelt, Okla.; $50,000 to Arthur (Ohio) Mutual Tel. Co.; $213,000 to Cities Tel Co., Chapel Hill, Tenn.; $51,000 to Eastern New Mexico Rural Tel. Co-op, Clovis. N. Mex. New loan allocations included: $499,000 to Northwest Louisiana Tel. Co., Shreveport, La.; $154,000 to Chouteau (Okla.) Tel. Co.

REA RECRUITS GRADUATES. Rural Electrification Administration (REA) is recruiting electrical engineering students for its telephone & electrical trainee programs. Probational appointments will be made at $3,410 per year. If applicant has master's degree, or six months' professional engineering experience in addition to Bachelor of Science degree in electrical engineering, starting salary will be $4,205 per year. Engineers who demonstrate ability can advance progressively to positions paying $8,360 per year & higher. Electrical engineering graduates who are interested should contact Henry C. Starnes, chief, Personnel Division, REA, U.S. Department of Agriculture, Washington 25, D.C.

CROSS-COUNTRY REPORTS. A telephone thief is on the prowl in Newark, N.J. Last month Leo Cuttino reported thieves broke into his house & stole his telephone . . . When Harlowe H. Curtice, pres. of General Motors Co. completed $26,000,000 purchase of Kaiser Motor Corp.'s Willow Run plant last month, he closed deal from hotel telephone booth . . . Lyle Chamberlain, resort owner in Cape Fair, Mo. area solved his telephone problem last month. Unable to obtain telephone service, Chamberlain rigged up mobile radio telephone in old automobile. Now he can be half a mile down the James river & hear telephone. It doesn't ring. It honks with a loud blast.

PEOPLE IN THE NEWS. P. C. Ward elected director of Southeastern Tel. Co., subsidiary of Central Electric & Gas Co., Lincoln, Neb . . . Eugene J. McNeely, AT&T vice-pres. in charge of public relations, named to take charge of AT&T's operating & engineering dept. . . . H. Randolph Maddox, pres. of Chesapeake & Potomac Tel. Co., elected AT&T vice-pres. He will succeed Mr. McNeely . . . James W. Cook, vice-pres. of Northwestern Bell Tel. Co., elected AT&T vice-pres. in charge of revenue requirements studies . . . O'Neill Kidd, Scottsville, Ky. mgr. of Southern Continental Tel. Co. named commercial

Please Turn To Page 20

Here's a new, low-cost rural line wire—the Copperweld* O-Eighty-Thirty (diameter .080"-30% conductivity)—that offers all the advantages formerly found only in higher priced conductors—rust resistance, permanent high strength and excellent voice and high frequency transmission characteristics. Yet, this Extra High-Strength Copperweld Telephone Line Wire sells for a price that will lower your rural line costs.

Having a tensile strength of 175,000 pounds per square inch and weighing only 94 pounds per mile, the O-Eighty-Thirty can be safely and economically strung on long spans comparable to those used with larger, heavier wires. Furthermore, its light weight assures substantial savings in construction, handling, and shipping costs.

And because Copperweld is the only high-strength conductor suitable for carrier current systems, you can build with O-Eighty-Thirty now—and when required—you can convert to carrier circuits without additional investment in overhead lines.

For your short subscriber loops and secondary toll lines, get peak performance at lowest cost by stringing Copperweld O-Eighty-Thirty—the new rural telephone line wire that combines the savings of long-span construction with the economies of a smaller, lighter, non-rusting conductor.

For prices, sag data and staking tables, write us today—there's no obligation.

*Trade Mark

COPPERWELD STEEL COMPANY
Glassport, Pa.
SALES OFFICES IN PRINCIPAL CITIES

Copperweld
TRADE MARK

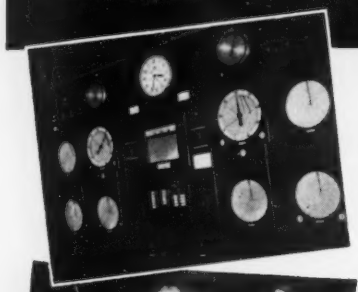
Diameter .080"
30%
Conductivity

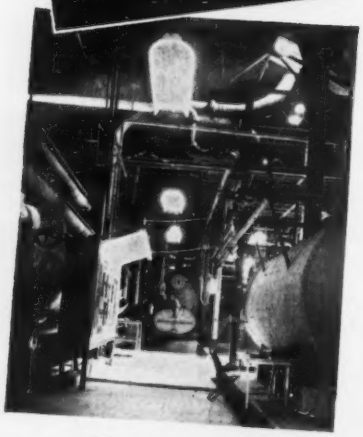
LINE WIRE

SOLD BY
LEADING
DISTRIBUTORS

The only conductor combining the strength of steel with the conductivity and permanence of copper!

PRECISE CONTROLS ASSURE LONG LIFE TO TAYLOR-COLQUITT POLES



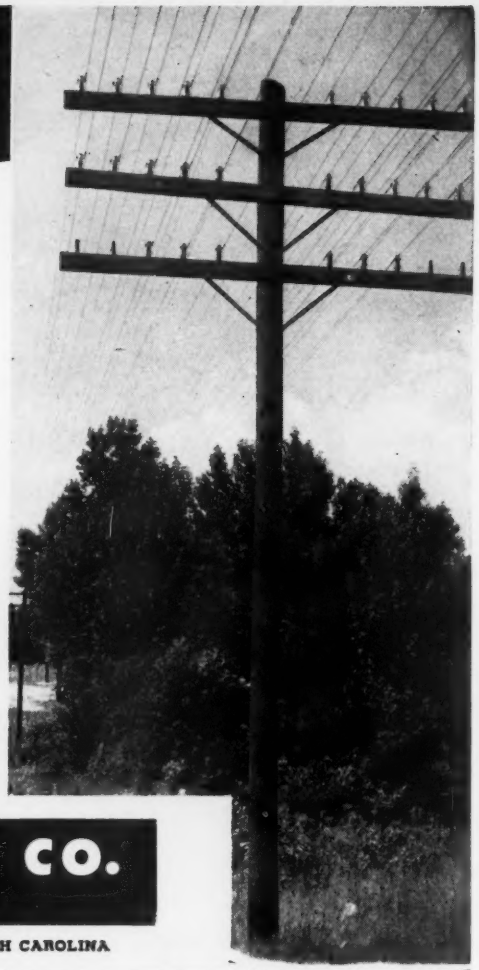


From the pine forests of the Southeast to the outbound loaded car, each step in Taylor-Colquitt pole production is subject to precise and accurate control.

These controls cover timber selection and pole manufacture as well as moisture removal and preservative treatment. Developed and refined during the 27 years that Taylor-Colquitt has been a producer of fine poles, they assure uniform high quality and consequent maximum life.

For poles in which nothing has been left to chance, specify Taylor-Colquitt treated pine.

Taylor-Colquitt poles are distributed to independent telephone companies exclusively by Automatic Electric Sales Corporation, 1033 West Van Buren Street, Chicago 7, Illinois.



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LINE AUTOMATICALLY CLEAR, WHEN SUBSCRIBER HANGS UP...

ONLY THE TELE-SYSTEMS AUTOMATIC DISCONNECT

HOOK-SWITCH HOWLER

HAS THIS ABSOLUTELY NEW FEATURE!

- FIELD TESTED AND PROVEN MANY SATISFIED USERS
- PORTABLE
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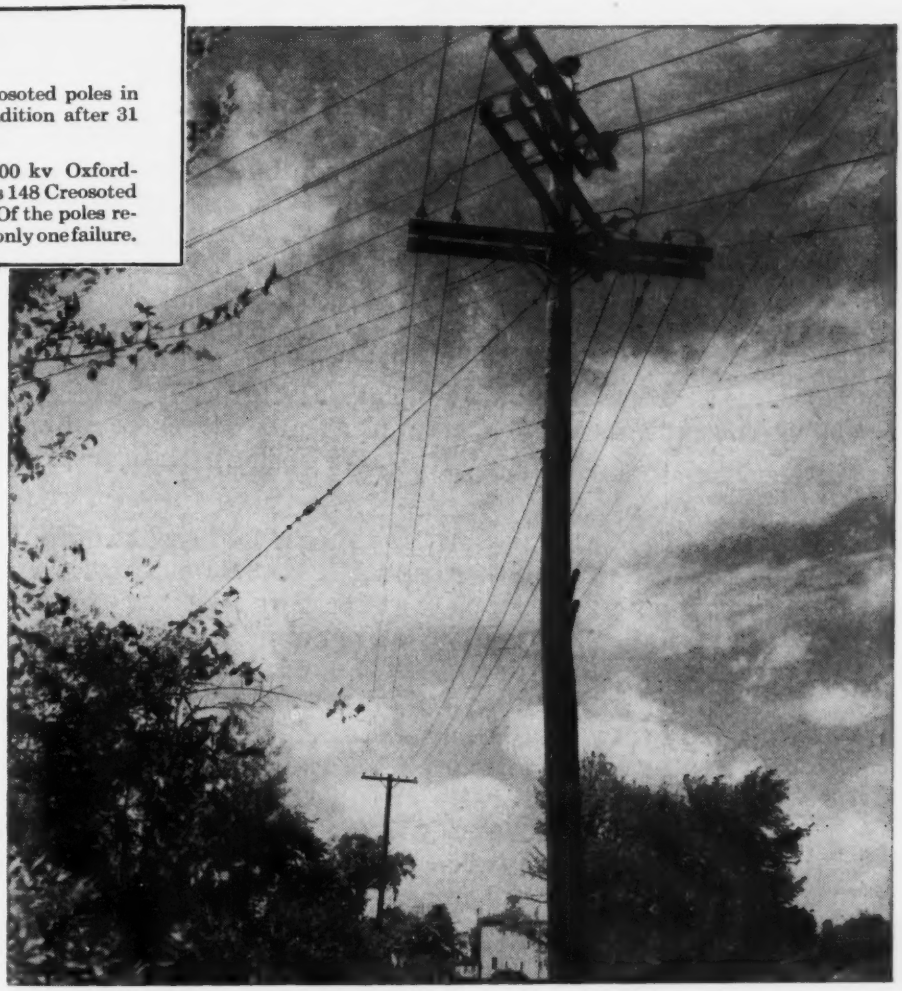
. . . Here's Proof of Performance

A MICHIGAN ELECTRIC COMPANY REPORTS: 425 CREOSOTED POLES INSTALLED IN 1922 . . . ONLY ONE REMOVED FOR DECAY

THIS CLOSE-UP of one of the Creosoted poles in the line shows its excellent condition after 31 years of service.

DETROIT EDISON COMPANY'S 24,000 kv Oxford-Romeo transmission line includes 148 Creosoted poles that were installed in 1922. Of the poles removed, decay was responsible for only one failure.



In 1922, Detroit Edison Company installed a 14-mile 24,000 kv transmission line between Oxford and Romeo, Mich., using 425 poles treated with Creosote. Thirty-one years later, 148 of the original poles are still in the line.

But of the 277 removed, *only one was taken out because of decay.* The others were removed because of road widening, residential and industrial construction, automobile accidents and storms. And many of the poles removed were reused in other locations.

In the Detroit Edison System—which has over 600,000 poles—nearly three-fourths are treated with Creosote. Their Supervising Engineer of Inspection and Standards points out, "Creosote is an excellent preservative with an enviable service record. It offers absolute reliability, great lasting power and adequate cleanliness for pole use."

The Creosoted poles are southern pine and cedar, and company officials say southern pine poles wouldn't last five years without Creosote, but they'll last 30 to 60 years with it.

Service records like this are important to you because they prove the time-tested effectiveness of Creosote as a wood preservative. Its toxicity and permanence have made it first choice among users of treated wood.

For the finest pole and crossarm performance always specify U·S·S Creosote, the uniform product of continuous processing in America's largest tar distillation plant. For complete information, contact our nearest Coal Chemical sales office or write directly to United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa.

U·S·S CREOSOTE

3-1682

UNITED STATES STEEL

NEWSLETTER
TELEPHONE ENGINEER

(Continued From Page 16)

supv. with headquarters at Elizabethtown, Ky. Tom Short succeeds Mr. Kidd at Scottsville . . . Robert Soland, mgr., Central Iowa Tel. Co., State Center, Ia., named mgr. at Sigourney, Ia.

DEATHS OF INDUSTRY MEMBERS. Edward S. Goodrich, 85, director of Eastern Indiana Tel. Co., Winchester, Ind., died Nov. 21 . . . Henry C. Roemer, vice pres. of International Tel & Tel., died Nov. 15 . . . Mrs. M. F. LaCroix, New York City, wife of board chairman, General Tel. Corp.

INDUSTRY HIGHLIGHTS: – Mineola (Kans.) Tel. Exchange will convert to dial in '54 . . . Sunflower Tel. Co., Tribune, Kans., planning $71,000 sale of stock. Owner H. E. Puckett said REA loan of $650,000 will be available to company when stock sale is completed . . . Stromberg-Carlson Co., Rochester, N. Y., declared 50 cents dividend on its preferred stock, payable Jan. 1 to stockholders of record Dec. 1. Company also declared 37-1/2c dividend on common stock, payable Dec. 31 to stockholders of record Dec. 15. . . H. J. Heuther, Jr., pres., General Tel. Co. of Ky., announced Ashland, Ky., will be converted to dial . . . "Putnam County(Tenn.) Herald" recently praised Southern Continental Tel. Co.'s contribution to economic life of Cookeville, Tenn. News item pointed out company has payroll of $245,000 annually.

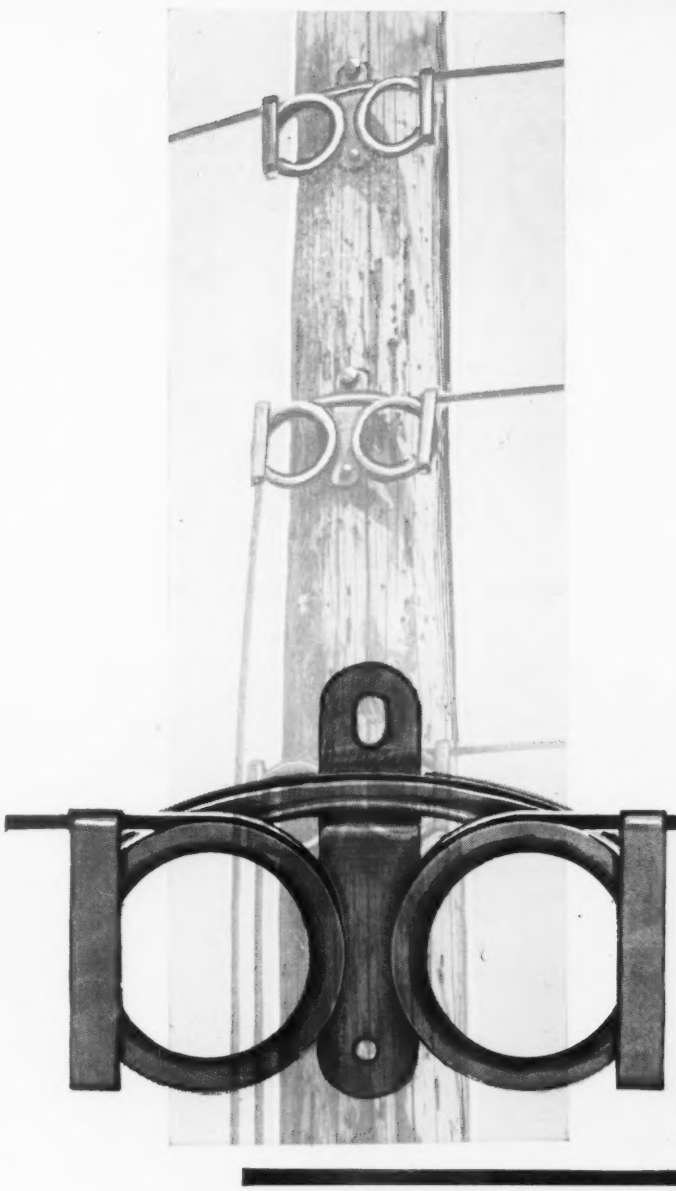
Texas Tel. Co. & Southwestern Bell making survey to establish direct dialing between Garland, Tex., & Dallas . . . Group organized at Lusk, Wyoming, plans application for REA telephone loan to build system to serve Nobrara county & surrounding area . . . General Tel. Co. of Ill. presented 20-year service pin to Frank Cima, exchange manager for company in Franklin County . . . General Tel. Co. of Calif. purchased property in Santa Monica, Calif., to provide for future expansion of dial system there . . . James Valley Tel. Co-op., Groton, S. D., approved loan contract which will provide $1,217,000 of REA loan funds . . . Marshall County Tel. Co., Warren, Minn., placed new automatic equipment in service at Alvarado, Minn.

Southwest States Tel. Co. began installation of dial telephones in England, Ark., following installation of telephones in rural areas between Keo, Tucker & Humnoke . . . Stockton (Calif.) Tel. Co. purchased property at Cassadaga for location of exchange building. Change over of system is scheduled for next spring.

Ray W. Smith, Editor

now!

SELF-SUPPORTING ANSONIA Ankoseal® CABLE*
with the new
CHANNELL SUPPORTS



Now Ankoseal brings you even *greater savings than before* in the cost of cable installation and maintenance.

This is done by using the new Type 775-P-SS Ankoseal Cable on Channell Cable Supports—without a messenger strand and on spans up to 380 feet.

In actual test the Channell Support holds the cable to failure without damage to the cable core or jacket within the support.

Send for your copy of "Installation Data and Procedures." Use this new construction on your next job.

Channell Supports will soon be available through telephone cable jobbers.

*Orders are now being accepted for Type 775-P-SS Size 19 AWG self-supporting Ankoseal telephone cable in 6, 11, 16 and 26 pairs. Present Type 611 Size 19 AWG self-supporting drop cable also is suitable for use with Channell Supports.

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Every anchor man prefers
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Not two... Not four...
but EIGHT blades

for better load distribution

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Telephones play an important role in the lives of all of us. The story of this everyday instrument is a fascinating one as told in this book. Everyone will find worthwhile this clear, well-demonstrated presentation of the function of telephones. The Schneiders begin with a simple, nondial phone and manual switchboard and move step by step to a full explanation of the highly complex boards which handle large city, modern telephoning.

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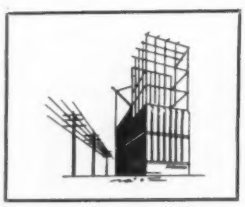
INDUSTRY OUTLOOK

"Vital news is not what has happened. Vital news is what is going to happen."



OUTLOOK: — Strong reassurance as to business outlook for 1954 is prevailing tone of reports by 138 leading economists recently polled by Thomas S. Holden, vice chairman of F. W. Dodge Corp.

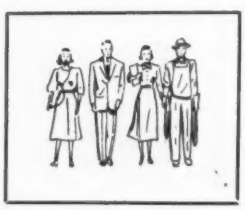
Next year will likely be the nation's 2nd biggest business year, according to majority opinion. Mr. Holden, writing in the November issue of ARCHITECTURAL RECORD, says that the economists think "the anticipated drop from the boom levels of 1953 will be quite mild."

Of the economists polled 49 are in business organizations, 41 in colleges, 28 in financial organizations, four in government.

Moderately declining construction activity is expected by a majority, as measured in 1954 by estimates to be made by the government. They forecast that next year's government totals will be down 8 per cent from 1953 in dollar volume. The majority expect this decline will be partly due to moderate price declines, and to lessening of overtime although higher hourly wage scales are expected.

There is general expectation of a decline in residential building, but nevertheless a big year of more than 1,000,000 non-farm dwelling units, which would be a decline of about 7 per cent from what is expected to be this year's total in dollars.

The summary of replies indicates expected moderate declines of less than five per cent in the nation's total output of goods and services, commonly known as gross national product. But 19 of the experts expect next year to be a bigger year than 1953, while 41 expect a fairly severe drop.



TAXES: — A compromise on the corporation income tax rate to 50% was foreseen last month in some quarters as speculation continued on the tax outlook during the 1954 Congressional session. Although the Eisenhower administration is reported to be sticking to the view that the present 52% rate should be retained, there is also impetus for permitting the reduction to 47%, scheduled for April 1, to stand, and a compromise at 50% is felt to be a very likely outcome.

As the government's overall fiscal situation continues to shape up, and further indications are given of next year's tax prospects, chances for any real adjustment in inequitable excise taxes on necessities such as communications do not appear particularly good.

Meanwhile, there is growing talk of the possibility of continuing the existing Social Security tax rates of 1½% on both employer and employe, and freezing the automatic boost to 2% on each. The automatic boost under Social Security law takes place Jan. 1, but could be halted retroactively by legislation. Probably an administration decision on Social Security rates will await completion of a study of the field by a House Ways & Means subcommittee headed by Rep. Carl Curtis (R., Nebr.). It has been pointed out that, for wage-earners in the lower tax brackets, the Social Security tax rise will completely offset the benefits of lower personal income levies going into effect Jan. 1.

REGULATION: — State Regulatory commissions must be prepared — by obtaining qualified staff personnel and through enabling legislation to make regulation effective — to assume responsibilities which are being returned to them as a result of the policies of the present administration in Washington, Eugene S. Loughlin, Chairman of the Connecticut Public Utilities Commission, declared recently.

Addressing the American Gas Association convention in St. Louis on the subject of privileges and responsibilities of state's rights, Mr. Loughlin warned that "the commission which misconceives its position and presumes that its principal purpose is to oppose the industry can do no one any good. On the other hand, if it becomes so persuaded of the infallibility of management or is so inadequately staffed that it is unable effectively to question the policies of the companies, the injury to the public and the investor, although indirect, is no less serious."

He added, "A sound state government operating within the limits of its jurisdiction and involving,

among other functions, an efficient, well-staffed, and effective regulatory commission will have a more salutary influence over those it governs than the federal government does."

The utility commission, he said "has a continuous responsibility in every matter before it. Regulation is a continuing process and a commission's concern is only beginning with the issuance of a decision."

THE FARMER: — Although drought has taken its toll in many sections of the country, the Department of Agriculture's latest report indicates that this year's crop output is the third largest ever, surpassed only by 1948 and 1952. With production of livestock products, particularly beef and veal, expected to be above last year, total farm output in 1953 of crops and livestock combined may approach last year's all-time high.

Plantings this year were stimulated no doubt by continued high price supports. In addition, many farmers wanted to be on record with a large acreage of those basic crops which, in compliance with present farm legislation, appeared likely to be restricted in 1954.

Heavy abandonment of winter wheat acreage as a result of drought in the Southwest and Central Great Plains was largely offset by a big winter crop in the corn belt States and by an abundant spring crop, other than durum. While indicated total wheat production of 1,163 million bushels is 128 million under last year, this crop added to a near record carryover provides a record 1953-54 wheat supply of 1,725 million bushels, excluding possible imports.

Supplies of most other food crops are also above last year. The rye crop is nearly 10 per cent larger, though still below average, and is augmented by heavy imports from Canada. Rice production is at a record level and the potato crop is larger.

The outlook for 1954 is uncertain, but Department of Agriculture economists have predicted that farm prices and incomes next year will be about the same as during 1953.

TAFT-HARTLEY LAW

Federal regulation of labor-management relations is undergoing some fundamental changes. Reason? — There will be some new National Labor Relations Board members administering the law — and some of them have views which differ markedly from those of their predecessors.

In everyday dealing between employers and their workers, the changes the new board will make could be of even greater significance than any T-H ammendments that Congress is likely to approve.

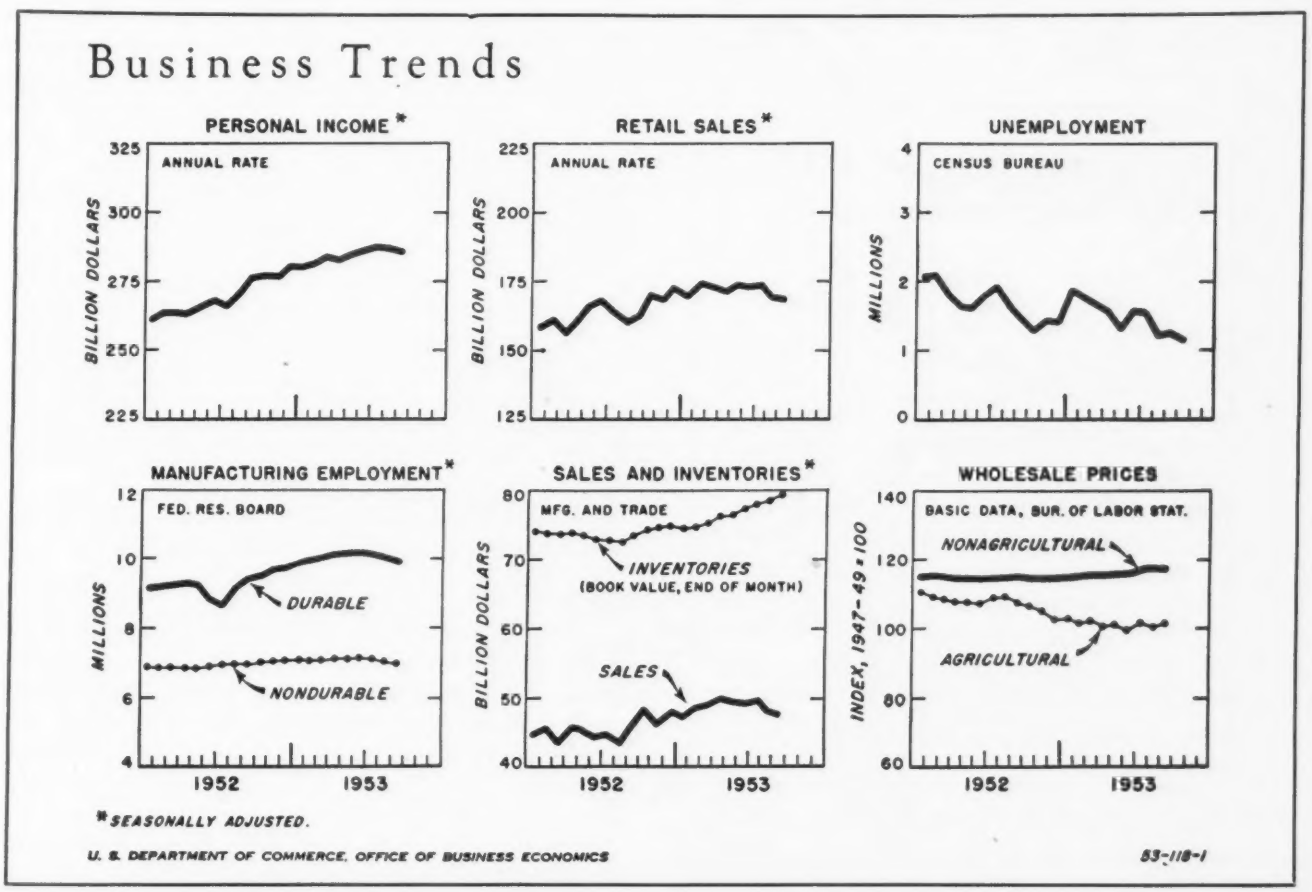
Exactly what all the N.L.R.B.-ordered changes will be can't be forecast right now, of course. But informed officials figure these will be among them:

Small employers are going to get a lot more freedom to run their labor relations their own way.

The states will get more authority to regulate labor relations.

All employers, little or big, will have more freedom to express their views on unionism without fear of reprisals by bureaucrats.

Both unions and employers will be expected to



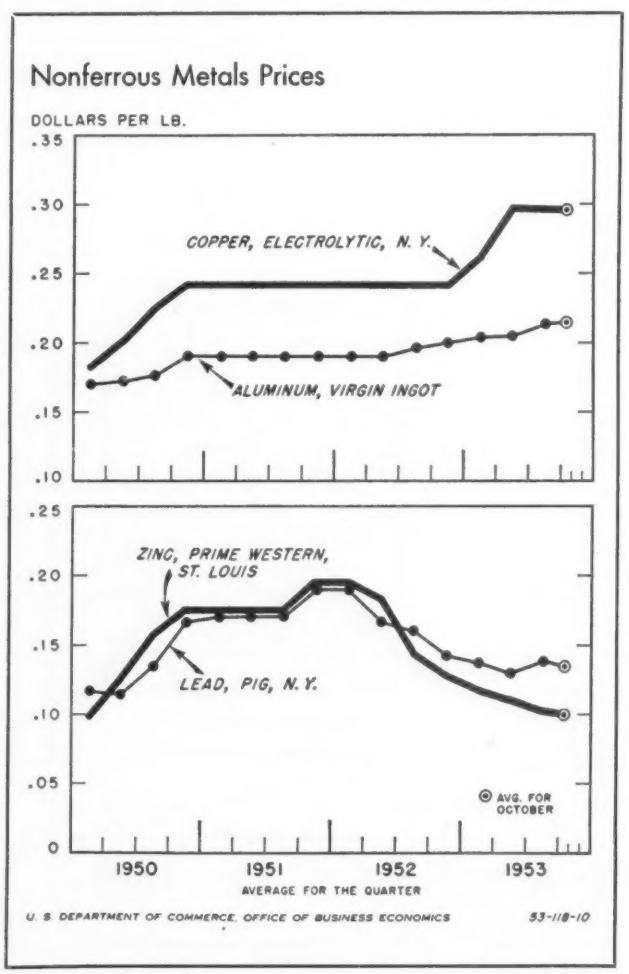
"behave like adults," to give up seeking special treatment when they don't. There's a strong feeling among the Eisenhower-appointed board members that T-H has been on the books so long now that union and company officials ought to know what it says and to obey its mandates, or else face the penalties.

All these changes, and a lot more, are likely because Taft-Hartley, like most other laws, means different things to different people. So changing the people who administer it amounts to changing the law itself.

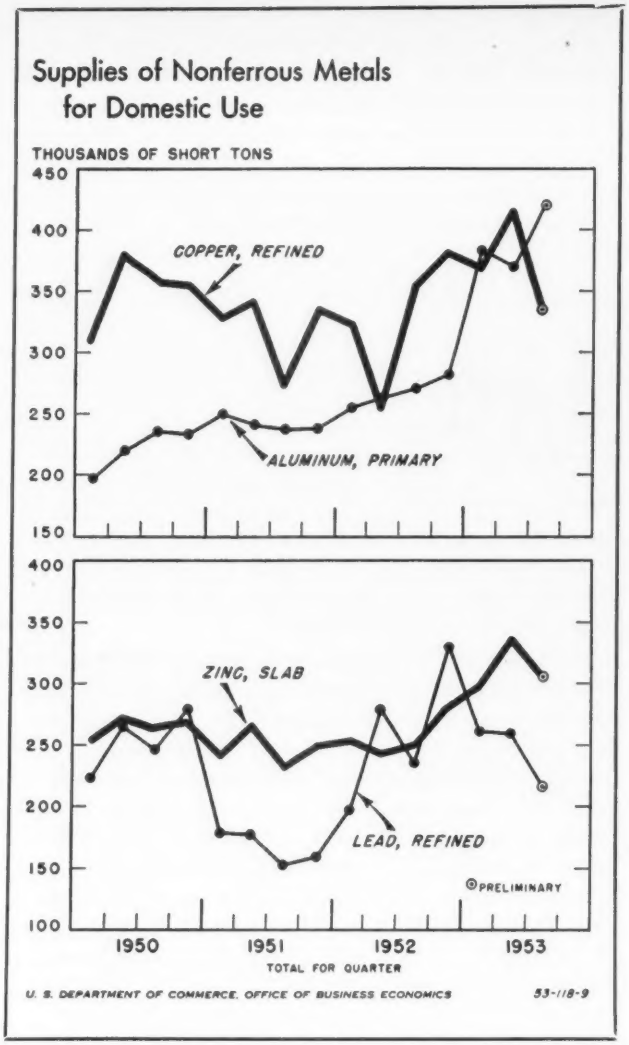
TELEVISION:—TV has become a brawny infant. About five years ago the Bell System opened for commercial use 916 miles of television channels to provide network service to 12 stations in five cities. Today there are more than 34,000 channel miles of facilities to carry network television to 150 stations in more than 100 cities. By the end of this year, it is expected that 47,000 channel miles will be in service.

To appreciate the story of growth behind the figures, one need only look at the highlight dates since May, 1948. In that year, the national political conventions were telecast to 18 stations in nine eastern cities. The midwest joined the chain in September, 1948, when seven major cities from Buffalo to St. Louis were linked. In January, 1949, the east and midwest networks were hooked together. TV took one giant step toward continental coverage when coast-to-coast service was inaugurated in September, 1951. Then, telecasts of the Japanese Peace Treaty Conference in San Francisco brought the immediacy of the present moment to watchers in the east. In July of 1952 an audience served by 107 stations in 65 cities saws the political conventions. A new dimension was added to TV coverage in September of last year when 50 theaters in 30 cities were linked on a closed circuit for the Walcott-Marciana fight. Then, in November, the nation watched history made on election day (coverage: 110 stations in 67 cities). And again in January, 1953, an estimated potential audience of 75,000,000 Americans witnessed the Presidential Inaugural ceremonies in Washington. In that same month, the U. S. extended the neighborly bond of television across our national border to Toronto, Canada, establishing the first regular video link between the two countries.

Even this short synopsis of TV's growth shows that the brawny infant is flourishing.



METALS PRICES: — The growing adequacy of supplies has had only a minor impact on the general price structure of raw and semi-manufactured materials and this has been limited largely to the secondary materials where some easing tendencies have developed.

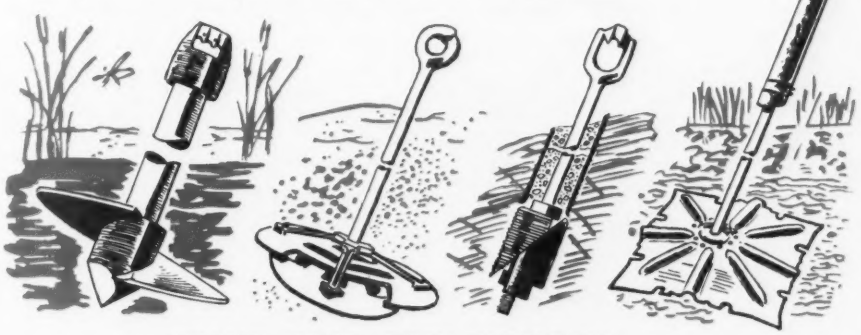


METAL OUTLOOK: — By the middle of this year, increased production and imports had brought supplies of the major metals to a level adequate to meet current requirements of industrial consumers.

GraybaR TELEPHONE NEWS

AND POLES ½ A MILE AWAY!

More than 2000 wires terminated here on the roof of the Boston telephone office building in 1883. From this structure, wires often swung free for one-half a mile before reaching the nearest pole – a system highly vulnerable to snow, sleet, and ice. Years of combating conditions like these, however, helped develop the well-known line of Hubbard pole-line hardware – hardware that's truly *experience-engineered*. For rugged, dependable items – from eye bolts to transposition brackets – Graybar reminds you to "hang the load on Hubbard."



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It really makes little difference – there's an anchor designed to do a quick, sure holding job in any soil classification. And . . . you can get the type best suited to your own local needs from one of 109 strategically located Graybar offices and warehouses across the nation.

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Buy Lenkurt microwave from Automatic Electric — the only company that's prepared to give you *switchboard-to-switchboard* microwave system engineering, based on years of *telephone experience.* Whether you are confronted with ordinary or with unusual toll problems, Automatic Electric is prepared to engineer the best type of toll system to meet your needs.

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For Off-Highway or Highway Operation

Now, INTERNATIONAL Truck advanced engineering makes possible another development in transportation efficiency—*two new medium-duty four-wheel drive models* that open new possibilities for truck operators in scores of fields.

You can haul men, tools, equipment to any job—through mud, sand, and snow—over terrain where conventional trucks can't go. With front axle disengaged, you can operate normally on the highway.

Tough-job engineered. These new models are built for the toughest kind of work. Like every INTERNATIONAL, they give the low operating and maintenance cost and long life that have made INTERNATIONAL the heavy-duty sales leader for 21 straight years.

These new INTERNATIONAL 4x4 models have the stamina, ruggedness, and versatility for the toughest jobs. See one today. See how it fits your work. Time payments arranged. See your INTERNATIONAL Dealer or Branch for all the facts.

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New INTERNATIONAL R-160 (4x4) with public utility equipment, including front-end winch. GVW rating, 11,000 lbs. Famous Comfo-Vision cab.

Brief Specifications of these new INTERNATIONAL medium-duty 4x4 models

Two chassis models. Model R-140 (4x4)—130-inch wheelbase, 60-inch CA; 142-inch wheelbase, 72-inch CA, GVW rating 11,000 lbs. Model R-160 (4x4)—154-inch wheelbase, 84-inch CA; 172-inch wheelbase, 102-inch CA, GVW rating 15,000 lbs.

All-truck power. Model R-140 (4x4), 100-hp. Silver Diamond 220 valve-in-head engine. Model R-160 (4x4), 108-hp. Silver Diamond 240 valve-in-head engine.

Eight forward speeds, two reverse. Transmission has four forward speeds, one reverse, with 2-speed transfer case.

Easily converted for highway use. Special transfer case permits disengaging front axle for normal 2-wheel drive operation.

Transmission power take-off openings on right and left side to handle front-mounted winch.

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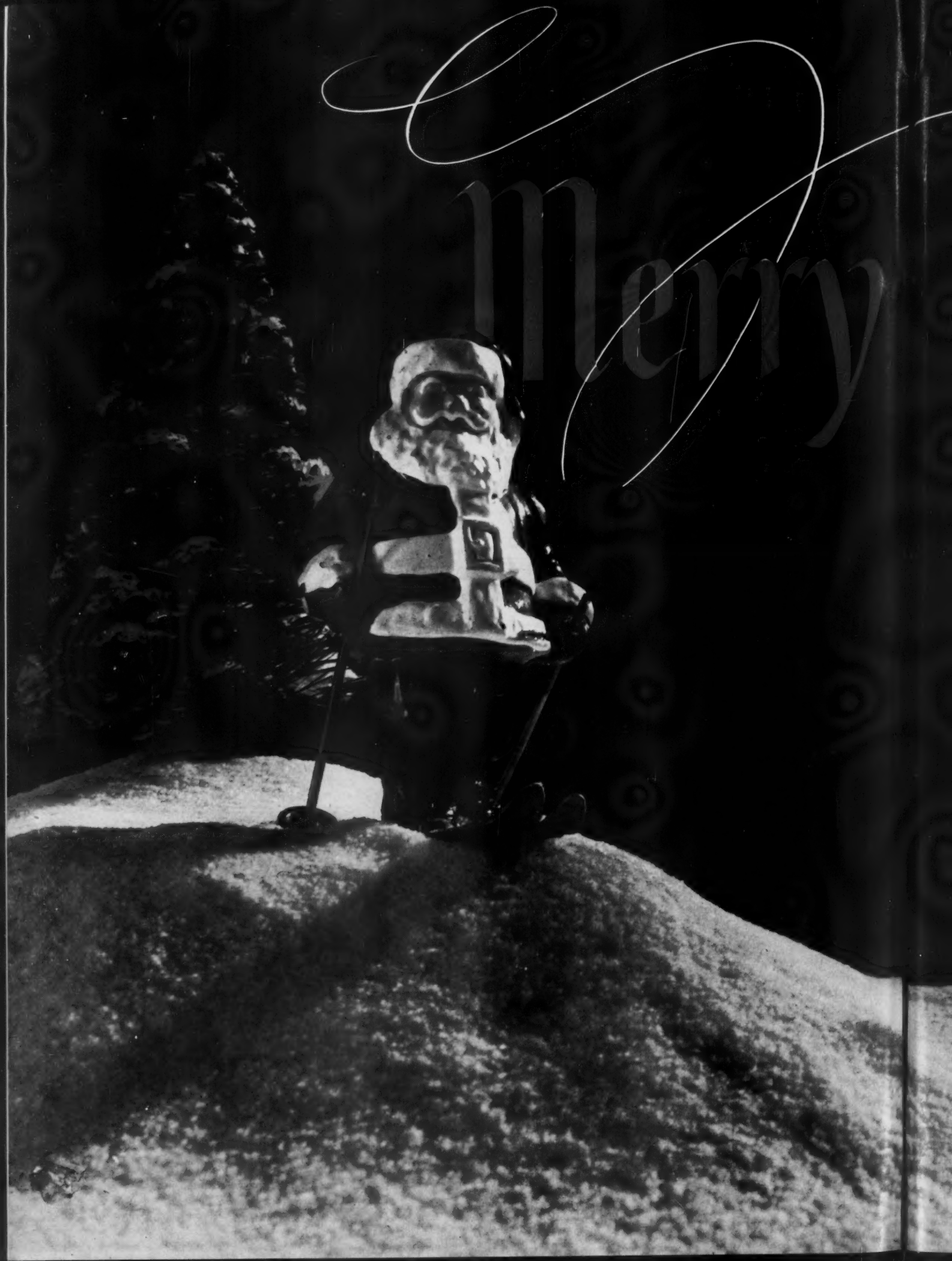
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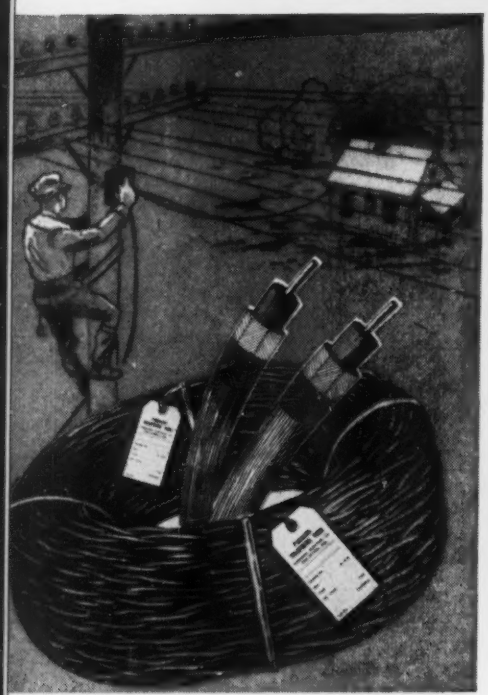

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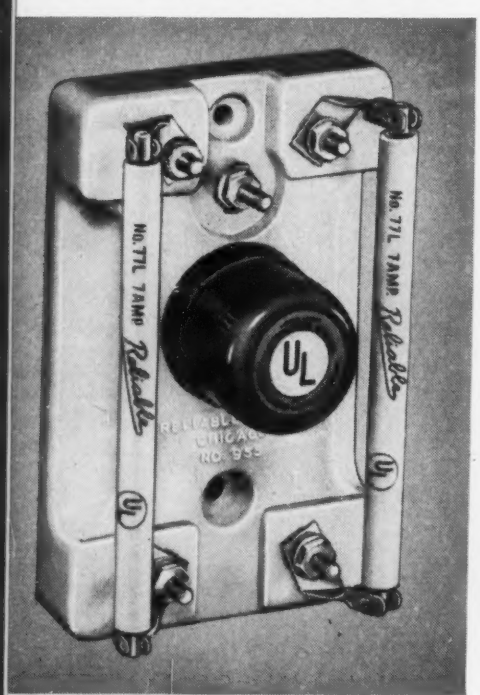

Simplicity of Design in the "955-A" Protector guarantees station protection. The P-495 Self-Cleaning Sawtooth Discharge Blocks allow static discharges to be drained without danger of leaving the line grounded. RELIABLE ELECTRIC CO.

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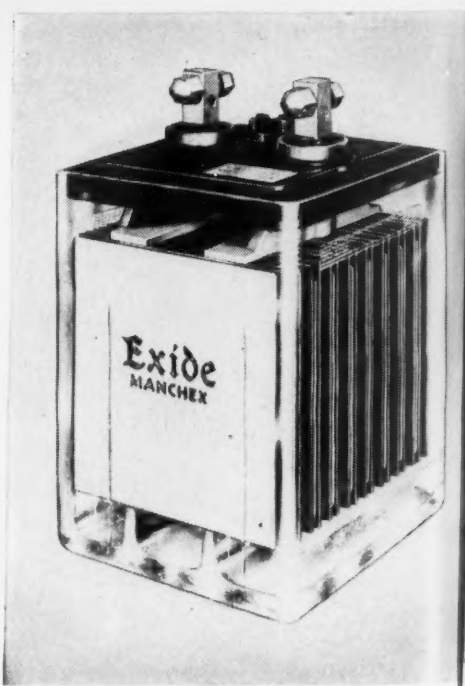

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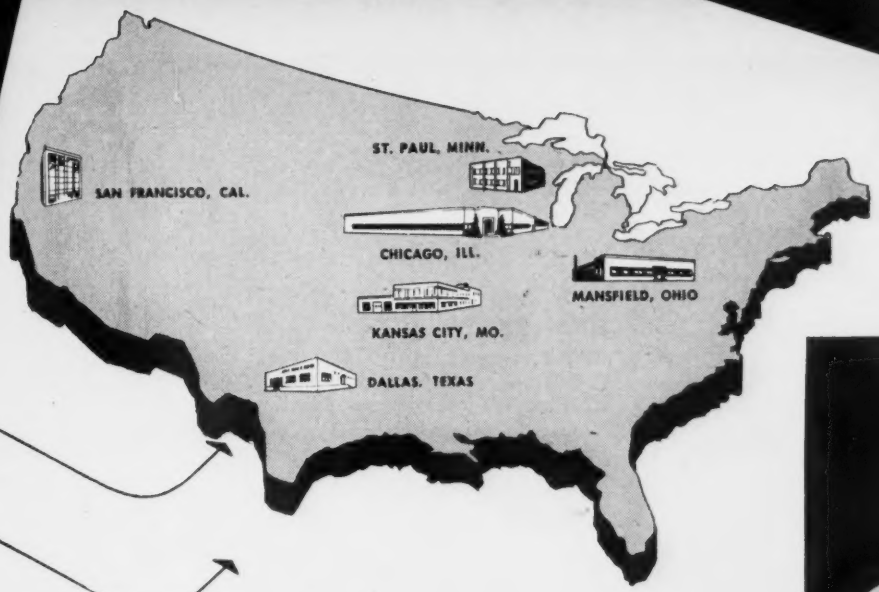

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Ringing Machine for Large or Small Telephone Systems! The compact TELERING rings through where other frequency converters fail. Self-starting, quiet running—delivering loud, clear ringing power. Cost of operation is low. Made by TELKOR, INC.

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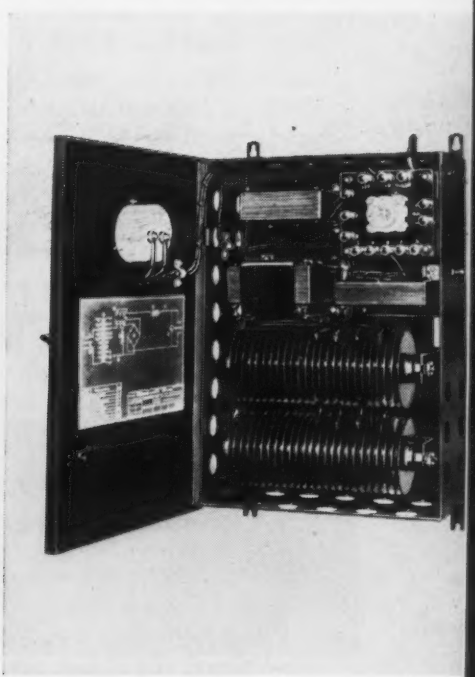
The Expanding Plates and Spreader Arms of Everstick Anchors insure 100% safety and maximum holding power under excessive strain. Ribbed base plate allows anchor to be locked solidly on rod. Quickly installed. Made by EVERSTICK ANCHOR CO.



Longer Storage Battery Life is assured by using the RB Electrox Automatic Charger—it maintains charging rate in proportion to drain on batteries. Humless operation permits charging while telephone system is in use. SCHAUER MFG. CORP.

A TELEPHONE BATTERY CASE THAT'S . . .

STRONG!
LIGHT!
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COMPACT!

Typical PlastiCal telephone battery installation of 420 A.H. capacity at the Lorain Telephone Company, Lorain, Ohio.

You can order C&D telephone batteries, either PlastiCal or PlastiCell, from all leading suppliers of telephone equipment. For details and specifications write for Bulletins T-527 and T-528.

C&D pioneered in using plastic cases to give telephone batteries added strength, lightness, compactness, and durability. Regardless of whether you prefer conventional grids (PlastiCell) or lead-calcium grids (PlastiCal) you can have the advantages of a plastic case in a C&D telephone battery.

YOU GET THESE ADVANTAGES!

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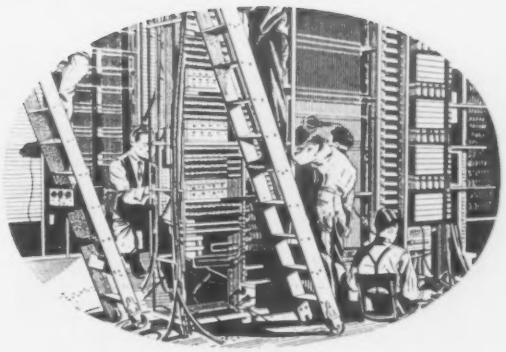
BATTERIES, INC.

of Conshohocken, Pa.

Manufacturers of Industrial Batteries since 1906

SALES AND SERVICE OFFICES IN PRINCIPAL CITIES FROM COAST TO COAST

Years Past And Years To Come



ONE way to appraise the prospects of the future is to study the actualities of the past. And if the recent past of these United States is any measurement of future growth, then industry in this country — including the telephone industry — now has a job ahead of it which has never been paralleled in the history of this nation.

Take, for instance, the record of our Gross National Production during the past ten years or so.

Start, for comparison, with the year 1938, when production was pretty well rolling again after the Great Depression. In that year our Gross National Production was $84 Billion — which seemed, at that time, to be pretty good.

Shortly thereafter, following the outbreak of World War II in Europe, we began to rearm. So in 1940 our national production rose to $101 Billion, and in 1941 it went up to $126 Billion.

Then began the upward spiral of that "fabulous decade" which started with 1942 — a period of four years of war and six of postwar and "cold war." Year after year, during that decade and since, our Gross National Production has increased. In 1952 it was $348 Billion, and 1953 has been estimated at $370 Billion.

Those figures are all, of course, in money at the value of the dollar at those times. We have, however, another basis for calculating our national growth — namely, population.

In 1940, according to the U. S. Census for that year, the population of the United States, in round figures, was 131,700,000. In 1950 it was 150,700,000.

That was an increase in population of 19,000,000 for the ten years, but the rate of gain was growing year by year. The most recent estimate by the U. S. Census Bureau was for September 1, 1953, when the population was estimated at 160,228,000.

That was a gain of 9,500,000 in about three and one-half years, or at the rate of 2,750,000 a year.

If this rate of population growth continues — and the experts seem to think that it will either continue or increase — then the population of the United States will be near the 180,000,000 mark in 1960!

We have made some calculations to ascertain what this growth in our national production and population has meant to the telephone industry.

During the "fabulous decade" from the end of 1941 to the end of 1951, telephones in this country doubled — from about 22,500,000 to about 45,000,000. Since 1951 another 5,000,000 telephones have been added, and the 50,000,000th telephone was installed in November, 1953.

From 1941 to the end of 1952, investment in telephone plant by commercial telephone companies has more than doubled. Bell System plant investment has increased from $5 Billion to near $12 Billion, and that System is investing around $1.4 Billion more in 1953.

Plant investment by Independent telephone companies has increased to the end of 1952 — the latest figures available — from about $450 Million to around $1¼ Billion.

To all this there should be added another and highly significant fact: Notwithstanding the present rapid growth of population, the number of telephones per 100 of the population has increased even more rapidly.

Late in 1953 there were approximately 31 telephones in service for each 100 of the population — the highest rate in the history of the industry. In 1941 the number was about 18 telephones for each 100 of the population.

Such are the highlights of some of the important factors in the recent growth of this nation. Whether such rates of growth will long continue is of course conjectural. But even if they diminish, the job ahead for the telephone industry is still a big one.

The biggest, perhaps, that it has ever faced!

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PLANT NOTES

By RICHARD ALLEN

"Over the years, technical advances have made it possible to build more efficient facilities."

New Automatic Test For Telephone Switch

A NEW AUTOMATIC method for testing telephone switching equipment was described at the Fall General Meeting of the American Institute of Electrical Engineers in the Hotel Muehlebach, Kansas City, Mo.

In a technical paper presented at a Communications Switching System session, A. N. Hanson, Western Electric Co., Chicago, pointed out that previously used automatic testing sets in some instances have lacked flexibility and manual tests have been slow and tedious and involve human errors.

A new device, known as the Universal Equipment Test Set, has been developed, Mr. Hanson said, "to eliminate the undesirable features of manual testing and still retain complete flexibility. The new test set reduces, sharply, the human equation as it automatically checks relay assemblies, wired to perform practically any switching function. Employing perforated type for switching control, the test set applies operating and test conditions to terminals of the wired assembly. Indicator lamps pinpoint terminals which fail to meet test conditions, and in most cases, indicated the nature of the trouble."

The set he described was designed for testing relay circuits up to 64 connecting block terminations, but "the design principles may be applied to testing larger assemblies up to practical limits of test set size and the switching principles could be used for testing other types of wired assemblies."

Telephone Amplifier

HOOK A TELEPHONE receiver onto a shoebox-size instrument that sits on top of the desk and you can have it amplify regular telephone talk to normal voice level.

This latest telephone device is now being manufactured in the U. S. for the first time under a license issued by Fonadek, Ltd., of England. Using the gadget, its backers say, a whole conference room full of executives can hear a voice over a telephone receiver. What's more, everybody present can talk back to the caller without leaving his seat.

The instrument that does the trick is a little metal box taking up only about as much space as the telephone itself. The earpiece of the receiver hooks over a hole near the top of the box, and the mouthpiece dangles over another opening underneath.

Sounds coming out of the receiver go into the box, are amplified and come out at voice level. If it's too loud, there's a volume control button on the side of the instrument for regulating.

Talk in a normal tone even when you're several feet away, and the instrument catches the voice and throws it back into the mouthpiece for the person on the other end to hear.

New Teleprinter Announced

A COMPACT, lightweight teleprinter that can send and receive messages at the rate of 100 words a minute was introduced to the commercial market last month. The machine is the creation of Edward E. Kleinschmidt, president of Kleinschmidt, Inc., Deerfield, Ill.

Kleinschmidt said that with engineering adjustments the teleprinter is capable of sending and receiving up to 150 words a minute, 2½ times faster than the 60 words a minute machines now in use. Use of the new machine previously had been restricted to the military services.

The high speed machine weighs 45 pounds compared to the 110 pounds of the machines now being used commercially. Kleinschmidt said the new teleprinters are in mass production and his company is geared to turn out a machine every 10 minutes. Teleprinters simultaneously transmit messages from one machine to any number of similar machines and operate on both wire and radio circuits.

The inventor said his company is entering the commercial field now to "give impetus to the electronic age of business communication which is only now beginning to emerge."

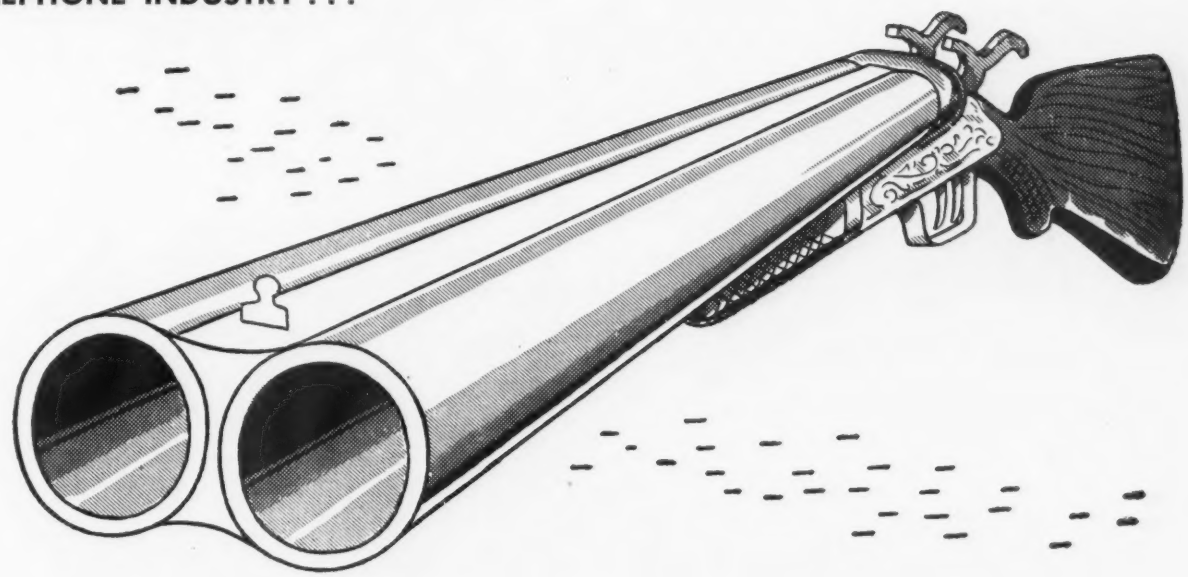
Kleinschmidt said that even the major users of teleprinters today, such as businesses in the transportation and communication fields, "have come nowhere near realizing the full potential of the machine." . . . He said his company intends to remedy this condition . . .

Kleinschmidt, 78, was one of the founders of Teletype corporation, which was sold in 1930 to Western Electric Co., manufacturing subsidiary of American Telephone & Telegraph Co., for 30 million dollars.

Among his inventions are an automatic telegraf switching system, one of the first automatic coin vending machines, the high speed stock ticker tape, and the present stock quotation equipment.

Kleinschmidt, Inc., currently is working on 45 separate research problems.

MANUFACTURERS and SUPPLIERS
Serving the Multi-Billion Dollar
TELEPHONE INDUSTRY . . .



Give Them Both Barrels in 1954

Aim your sights for as large a share as you would like to have of the millions of dollars to be spent by the telephone industry during the next three years.

Telephone Engineer's Research Bureau reports an expected expenditure of $1¼ billion annually during 1954-55-56 by telephone companies in the United States for new equipment, supplies, new construction, rebuilding, etc.

Aggressive firms will "shoot both barrels" in their big push for a huge portion of this business. By both barrels we mean a consistant advertising program in TELEPHONE ENGINEER Magazines . . . and . . . sufficient space in the big 1954 COMPOSITE CATALOG & BUYERS' DIRECTORY to properly display and describe their products.

DIRECTORY CIRCULATION — 12,000 — More than double that of any other telephone buying directory. Write for complete information.

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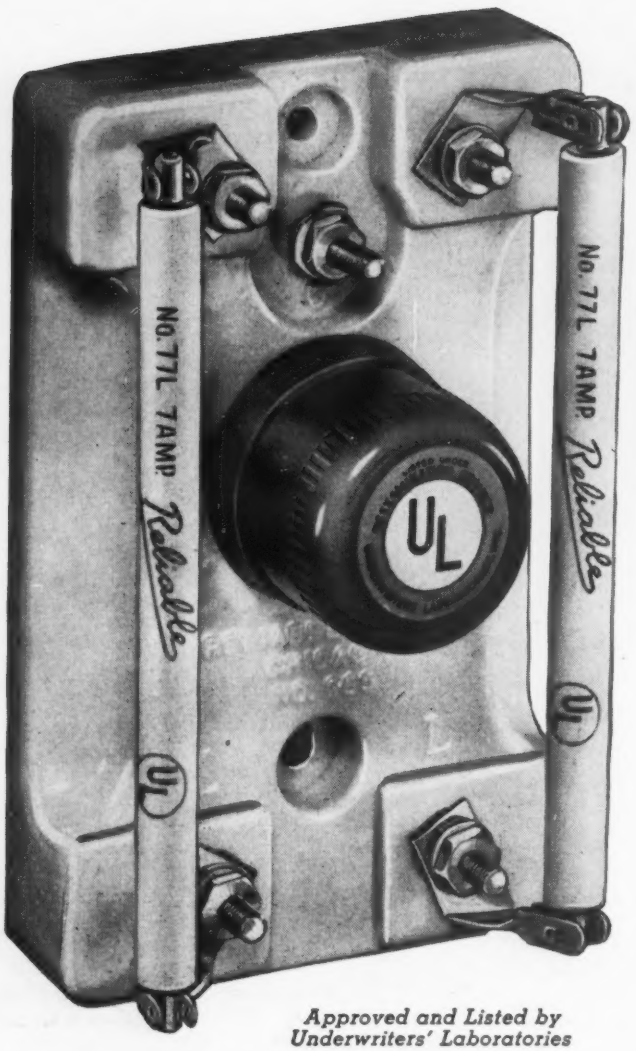
Season's Greetings...

Because the Telephone shares with Greeting Cards the pleasant duty of transmitting Christmas wishes, we give it an honored place in this message. From us who make it—to you who maintain its service—go the warmest sentiments of this happy season.

Stromberg-Carlson



Approved and Listed by Underwriters' Laboratories

The "955-A" Station Protector

In station protectors the difference will show up in the field.

The very simplicity of the "955-A" is your guarantee of trouble-free and enduring station protection. Design advantages, plus the famous P-495 Self-Cleaning Sawtooth Discharge Blocks, make the difference. Static discharges or surges are instantly drained without danger of leaving the line grounded. Why not ask to see a sample of the "955-A" for first-hand inspection and convince yourself of the difference. Standardize on "955-A's" — A Reliable Product.

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CHICAGO 12, ILLINOIS

Reliable

Telephone Protective and Terminal Equipment for all Station, Line and Central Office Needs.

OVER 45 YEARS SERVICE TO THE TELEPHONE INDUSTRY

By ROLAND DAVIES & FRED HENCK

REA announces policy on extended area service . . . FCC to study California Microwave plan . . . Rural carrier equipment tested by Bear River Telephone Co.

A POLICY on extended area service under which Rural Electrification Administration borrowers would pay for excess trunk mileage above eight or 10 miles has been announced by Administrator Nelsen.

Mr. Nelsen's policy statement to REA borrowers made it clear, however, that there probably will be relatively few instances of extended area service being provided over the longer distances.

He emphasized that EAS should exist only where there is a recognized community of interest between the exchanges involved, and generally where the station-to-station toll rate would be 20 cents or less; that the exchange areas should be contiguous, or nearly so; and that such arrangements should be held to a minimum, "to reduce costs and rates."

Standards considered by REA as "equitable," and presumably those under which the agency would approve a borrower's extended area service agreement, were listed as follows:

"(1) EAS should exist only where there is a recognized community of interest between the exchanges involved and where the distance between exchanges is not excessive (generally where station-to-station toll rate would be 20 cents or less).

"(2) The exchange areas should be contiguous, or nearly so.

"(3) In some cases, EAS may be justified on the basis that the handling of toll traffic between the points involved would be highly uneconomical.

"(4) Each company should provide its own termination and switching facilities, and through ownership or rental, one-half of the trunks. However, in those cases where EAS is to be provided over distances greater than indicated in item 1 above, the smaller exchange will provide the excess trunk mileage.

"(5) Because of the complexity of making cost separation studies, it is generally considered to be impracticable to administer an EAS agreement based on the annual charges of each party for providing its portion of the service.

"(6) EAS agreements should be separate from other agreements relating to such items as toll settlements, operator office assistance, and directory service."

Reviewing the previous discussions about EAS, Mr. Nelsen said the inability to arrive "at a mutually satisfactory conclusion left numerous REA borrowers, both Independent companies and cooperatives, without a firm basis for negotiating uniformly acceptable EAS agreements. Therefore, REA opened discussion with both the US Independent Telephone Association and the American Telephone & Telegraph Co. in the interest of its borrowers. Meanwhile, REA could not approve the EAS agreements proposed by many of the connecting companies because terms were found in many cases to be inequitable, and to result in costs and subscriber rates that would jeopardize loan feasibility.

"Although the associated Bell companies generally have not adopted a standard or uniform agreement for providing extended area service, it is our understanding that some companies have adopted standard reciprocal plans, and others have made substantial revisions in the agreements formerly offered in behalf of lower costs to the smaller rural exchanges. Therefore, it is suggested that bor-

rowers who are proposing extended area service with a Bell company take immediate steps to negotiate appropriate agreements as nearly in accord with the criteria listed herein as possible. The new agreements should be retroactive to the effective date of existing agreements whenever possible."

He went on, "In those instances where the Bell companies have indicated a willingness to negotiate EAS agreements on a reciprocal basis, each company would own or provide one-half of the trunks up to the midpoint of a distance of eight or 10 miles, each would provide its own termination and switching facilities, and there would be no charge from one company to the other. This latter approach is also accepted by many of the Independent telephone companies."

Mr. Nelsen attached to his statement the report of the Extended Area Service Subcommittee of the USITA Toll Compensation & Settlements Committee to this year's USITA convention. Standards laid down by the subcommittee were similar to those laid down by REA, including community of interest, contiguous exchanges, and the divisions of costs.

The REA statement supported the USITA group's findings, and recommended that its borrowers who have or are proposing EAS agreements with Independents should carry on negotiations on the basis outlined by the subcommittee.

"In proceeding with negotiations," Mr. Nelsen said, "all borrowers must be constantly aware of the effect of any proposed EAS charges on subscriber rates and on the economic stability of the system. All EAS agreements must be submitted for REA approval. Where the agreement submitted for REA approval provides that the borrower must make payments to the connecting company for EAS, it must be accompanied by a statement of the method for meeting these additional costs, as well as other operating expenses and debt service on the REA loan. REA approval cannot be given for those agreements which would adversely affect loan security.

"Borrowers should recognize that in some instances it might be better to establish toll service initially rather than provide extended area service at excessive costs which the majority of the subscribers are unwilling to assume. In any event, EAS should be held to a minimum in order to reduce costs and subscriber rates.

"Where borrowers are unable to arrive at an acceptable agreement, REA upon request will provide assistance to the extent possible. The AT&T company and the USITA have agreed to assist in difficult situations where a satisfactory agreement cannot be negotiated on the local level."

Coming Conventions

Minnesota Telephone Association, Radisson Hotel, Minneapolis, Feb. 1, 2, 3.

Kentucky Independent Telephone Association, Phoenix Hotel, Lexington, March 2.

Texas Telephone Association, Texas Hotel, Fort Worth, March 15, 16, 17.

Nebraska Telephone Association, Paxton Hotel, Omaha, March 23, 24.

Ohio Independent Telephone Association, Deshler Hilton, Columbus, March 29, 30, 31.

Iowa Independent Telephone Association, Fort Des Moines Hotel, Des Moines, April 6, 7.

Illinois Telephone Association, Pere Marquette Hotel, Peoria, April 26, 27.

Wisconsin State Telephone Association, Loraine Hotel, Madison, May 5, 6.

National Executive's Conference, Broadmoor Hotel, Colorado Springs, Colo., May 10, 11.

Kansas-Missouri Telephone Associations, Muehlebach Hotel, Kansas City, Mo., May 17, 18, 19.

Pennsylvania Independent Telephone Association, Bedford Springs Hotel, Bedford, May 25, 26.

New York State Telephone Association, Scaroon Manor, Scaroon Lake June 7, 8, 9.

California Independent Telephone Association, Fairmont Hotel, San Francisco, June 10, 11.

Indiana Telephone Association, Claypool Hotel, Indianapolis, June 17, 18.

Washington-Oregon Telephone Associations, Multnomah Hotel, Portland, June 18, 19.

Alabama-Mississippi Telephone Association, Thomas Jefferson Hotel, Birmingham, Ala., Nov. 8, 9.

FCC Seeks Comments on California Microwave Plan

COMMUNICATIONS common carriers and others have been given until Jan. 15, 1954, by the Federal Communications Commission to express their views on a California state government plan for a statewide microwave radio system which would serve all public safety agencies and carry government administrative traffic in off-peak periods.

The FCC called for comments by interested parties who believe "that the proposed amendment (to the FCC rules) should not be adopted."

In its notice, the Commission said it "has not made any determination as to whether amendments of the type proposed by the state of California would be in the public interest, and the Commission is not now proposing specific amendments to its rules."

Tied into the matter is an FCC hearing scheduled for Feb. 23 on whether the Federal-State Market News Service, California state-operated crop reporting system, must vacate its present radio frequency assignments. The Commission has ordered such action, because international radio agreements make the present frequencies no longer available for such use, but has withheld making the order effective.

REA Tests Rural Carrier Equipment

PROMISING performance by two types of subscriber carrier equipment, being tested over a 40-mile wire line of the Bear River Telephone Co. in Utah, has been reported by technical officials of REA.

The tests, over a route between Snowville and Tremonton, Utah, involve new "stackable" subscriber carrier equipment, produced by the Budelman Radio Corp., of Stamford, Conn., under an REA development contract, and type S carrier, made by the McElroy Manufacturing Co. of Littleton, Mass.

Preliminary tests of the McElroy equipment were made in Texas during June, at the Cap Rock Telephone Cooperative, Spur, Tex., and REA reported at that time that it offers good possibilities of cutting costs of providing rural telephone service in sparsely-settled areas.

The experiments in Utah, REA said, involve a further step in its efforts to uncover ways to reduce the investment required to bring telephone service to relatively isolated subscribers. REA said that, to evaluate further the new types of carrier equipment, it is planning installations of a similar nature in other parts of the United States in the near future.

Both the Budelman and the McElroy developments apply the carrier principle to connecting groups of subscribers to central offices, rather than to inter-office trunking.

The Budelman equipment adds three additional carrier message channels to a wire line, REA said.

Five channels of the McElroy type S carrier were installed on the wire line.—THE END.

50 Millionth Telephone Presented To President Eisenhower

Cleo F. Craig, Warren B. Clay, Rosel H. Hyde, and C. L. Doherty present nation's 50,000,000th telephone to President Dwight D. Eisenhower.

PRESIDENT Dwight D. Eisenhower, whose father entered the public utility and telephone field in 1913, took part in the commemoration of the telephone industry's biggest event 40 years later, when he accepted the nation's 50,000,000th telephone in ceremonies at the White House Wednesday morning, Nov. 18.

The chief executive was presented the 50,000,000th telephone — a "500" model rimmed with gold stars, and with a presidential seal instead of a number plate — by American Telephone & Telegraph Co. President Cleo F. Craig and US Independent Telephone Association President Warren B. Clay. FCC Chairman Rosel H. Hyde and President C. L. (Roy) Doherty of the National Association of Railroad & Utilities Commissioners attended the ceremony.

The same evening, top government officials joined with Bell System and Independent telephone leaders in observing the telephone industry's most important landmark in a banquet at Washington's Hotel Statler.

Postmaster General Arthur Summerfield, Mr. Craig, and Mr. Clay addressed the gathering, attended by such top government leaders as Defense Mobilizer Arthur S. Flemming, Deputy Secretary of Defense Roger M. Keyes, Atomic Energy Commission Chairman L. L. Strauss, Undersecretary of Commerce Walter Williams, General Services Administrator Edwin F. Mansure, Treasurer of the United States Ivy Baker Priest, Maj. Gen. W. B. Persons, Deputy Assistant to President Eisenhower, and Rural Electrification Administrator Ancher Nelsen, as well as three Senators — William L. Purtell (R. Conn.), John Marshall Butler (R. Md.) and J. William Fulbright (D. Ark.).

The banquet was attended by several hundred persons, including Congressmen, all members of the FCC, a number of state regulatory commissioners, business and civic leaders, most of the Presidents and a number of other officials of Bell System associated companies, heads of Independent telephone companies, Congressional and White House staff members, officers of the armed services, and a few officials of other communications companies.

As he placed the 50,000,000th telephone in the hands of President Eisenhower, Mr. Craig said that its presence in the White House will be a further reminder to telephone people of their responsibility to the nation.

"This responsibility is widely shared and deeply felt," Mr. Craig said. "Some 5300 companies and 800,000 employees work closely together at the job of bringing people together by telephone. We are grateful to the American people who have given us such opportunity, and we intend to keep on providing them with the best telephone service in the world."

After the telephone was plugged into a jack on the side of President Eisenhower's desk, Mr. Clay presented the President with a scroll stating "*Telephone*

service was born in America. Here in the climate of freedom it has been most widely developed and used. In ever-increasing measure, it has contributed to the unity, strength, and progress of the nation."

President Eisenhower made no formal statement at the White House ceremony, but tried the telephone immediately. After advising the White House switchboard operator that he did not wish to make a call, but was trying out his new telephone, he commented, "It checks up all right."

The President's father, David Eisenhower, joined a predecessor of United Utilities, Inc., 40 years ago, and worked with that organization until the time of his death a few years ago. The President's brother, Milton Eisenhower, was employed by the same organization several summers while attending college.

Mrs. Priest and Rep. J. D. Dingell (D., Mich.), who were at the head table, are former telephone employes.

Telephone Industry Has Big Share Of Challenge of Unity

IN HIS TALK at the banquet, Mr. Craig said, "President Eisenhower's acceptance this morning of the 50,000,000th telephone was a gracious and inspiring recognition of the part we play in the life of the nation. The President has done us a great honor. He has also given us, I think, new cause to weigh our opportunities and our responsibilities."

The AT&T President brought out that President Eisenhower, in his inaugural address last January, said 'that the strength of all free peoples lies in their unity.' And he went on to say, "To produce this unity, to meet the challenge of our time, destiny has laid on our country the responsibility of the free world's leadership."

To the telephone industry, Mr. Craig said, this means that "a very considerable share of the responsibility the President speaks of rests on us. The nation's capacity for leadership in the free world begins with unity at home. If Americans are to come together and work together with greatest effectiveness, they must be just as free as possible to talk with each other. They must learn from each other, think with each other, plan with each other, grow with each other. They must communicate. And they must be able to do so with complete ease and freedom, wherever they are and whatever their need."

Mr. Craig added, "This country leads the world in telephone service because we have never let up in our efforts to find a better way. We wouldn't be serving 50,000,000 telephones today if we were still limited to the methods and means of the past. The quality of service wouldn't attract that many customers, the cost would be too high, and even if these things were not true we couldn't find enough people to do the job.

"Furthermore — and this is what I want to emphasize — the very progress we are celebrating, and the changes we set in motion, affect us fully as much as they affect anyone else.

"For instance, we make it possible for industry and the armed forces to coordinate their operations on a broader and broader scale — and then what happens? They promptly ask us for services that require us to coordinate our own work more than ever before.

50-millionth telephone is rimmed with 48 gold stars, one for each state. The presidential seal takes the place of the number plate. Dial and numerals are done in gold. The following is inscribed on top of the handset—*"The Fifty Millionth Telephone In Service To The Nation Presented To The President of the United States, Dwight D. Eisenhower — November 18, 1953."*

"Again, telephone progress has greatly expanded the local service areas where subscribers have a close community of interest. And again the result, in more and more places, is to bring Independent and Bell companies into the closest possible association in providing the local service."

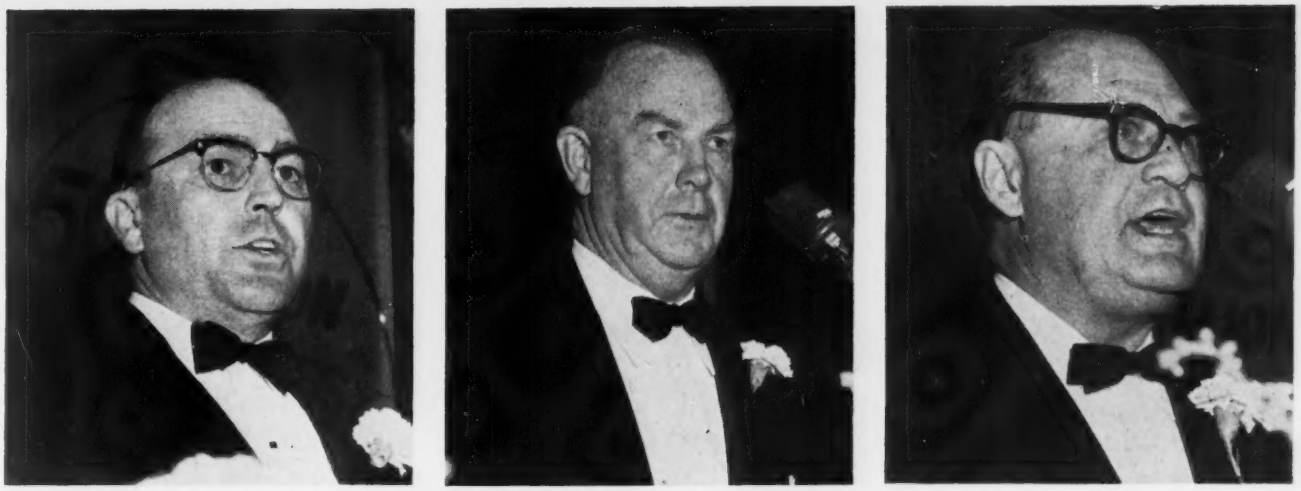
The AT&T President commented, "The real meaning of 50,000,000 telephones is not in their total number but in the people we bring together in every community in the land. The secret of our success in serving others is not in the machines we use, but in the ways we choose to use them. We have always used machines. As we use them more and more in the years ahead, we must be diligent to make sure that our human spirit of service is fully maintained and always shines forth strong and clear."

US Leadership In Field Not An Accident

MR. CLAY, in his talk at the banquet, brought out that the Independent branch of the telephone industry, "with almost 9,000,000 telephones, is the smaller segment of this great business — smaller in terms of the number of telephones served, but much larger in terms of the number of cities, towns, and areas served by our branch of the industry."

He went on, "Under a system of private enterprise, the telephone industry has been fostered so that today there is one telephone in this country for about every three persons. This compares with one telephone for each 68 persons in the rest of the world."

The USITA President, who heads the Hutchinson (Minn.) Telephone Co., said "It is not by accident that the United States leads the entire rest of the world in telephone development.



Photos taken during 50-millionth telephone dinner show (l. to r.)—WARREN B. CLAY, (right) president, United States Independent Telephone Association, addressing telephone dinner; CLEO F. CRAIG, A. T. & T. president; and CARL D. BROREIN, president and general manager of the Peninsular Telephone Co., Tampa, Fla., who was toastmaster at the 50-millionth telephone dinner.

"Many people with confidence in telephone management and the future of our industry have entrusted their savings to us. It is those people who were always the indispensable ones in a free economy.

"The telephone is an asset of large dimensions to the business and social life of the nation. Someone has said that since the curtain went up on human history, no single thing has exerted a more far-reaching influence upon the life of the average person than has the miracle of the telephone."

The greatness of the telephone industry, he commented, "does not spring alone" from its physical plant, but more "from the spirit of service of the people who man the lines — the management, the department heads, the supervisors, the operators, the installers, the linemen, the cable splicers, and all of the other loyal men and women employed in an essential calling.

"The enthusiasm these people put into their jobs comes from a characteristic common to all — a desire to do their part in providing a constantly-improved communication service for the public."

Postmaster General Summerfield, who devoted most of his address to a review of the accomplishments of the Eisenhower administration to date, said "We in government share with you and with all of our citizens a profound interest in the continued growth and improvement of the nation's communication services and their significance to our common welfare and progress.

"We realize, as does every thoughtful American, that without adequate communications between individuals, our modern society could not function successfully . . . As our country has grown and developed, so, too, has the unprecedented use of our communications systems."

He declared, "With your far-flung communication systems and your hundreds of thousands of employes and stockholders, the telephone industry has a vital stake — an all absorbing interest in a free economy in this country — in an economy that is solvent today and will be kept solvent tomorrow."

At the head table, in addition to Postmaster General Summerfield, Mr. Craig, Mr. Clay, Dr. Flemming, Chairman Hyde, Mr. Doherty, Mr. Keyes, Mrs. Priest, Senators Butler, Purtell, and Fulbright, Chairman Strauss, General Persons, Mr. Mansure, and Mr. Williams, were AT&T Executive Vice President Hal S. Dumas, AT&T Vice President George L. Best, Associated Telephone & Telegraph Co. President F. S. Spring, United Utilities President Alden L. Hart, Carolina Telephone & Telegraph Co. President L. W. Hill, Reps. Dingell, August H. Andresen (R. Minn.), and Carl Hinshaw (R. Calif.) and Carl D. Brorein, Peninsular Telephone Co. President, who was toastmaster.

Mrs. Gilbert Grosvenor, daughter of Alexander Graham Bell, and her husband, Dr. Grosvenor, who heads the National Geographic Society, were introduced from the floor, as was REA Administrator, Ancher Nelsen.

An editorial in *Colliers* on the event pointed out that Bell System-Independent relationships are largely cooperative rather than competitive. It said, "The telephone industry is primarily a network of community enterprises, hometown operated and, to a great extent, hometown owned. The telephone system is typically, perhaps uniquely, American — a private enterprise which can remain intimate, friendly, and local in spite of vast and continuing expansion." — THE END.

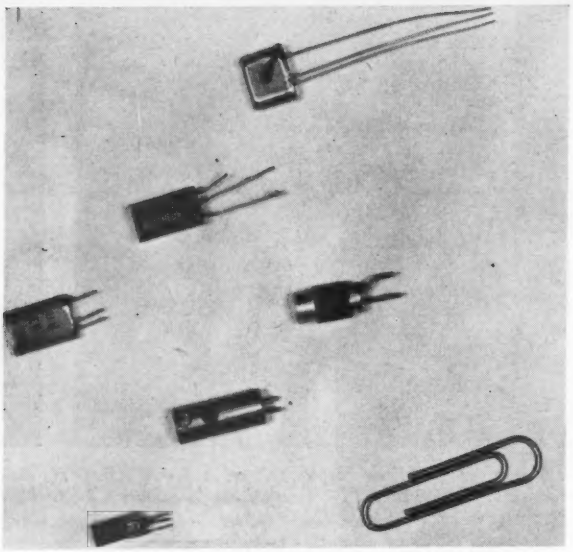


FIGURE ONE:—Point-Contact and junction-type transistors available commercially.

TRANSISTORS and THEIR APPLICATIONS

BY ROBERT P. DIMMER*

IN 1907 A YOUNG American electrical engineer named De Forest discovered that if he placed a wire connected to a battery in the path of a stream of electrons in a vacuum tube, he could control the flow of these electrons by varying the voltage from the battery. By this simple technique he was able to interrupt, reduce, or stop entirely the electron flow between the negatively charged filament and the positively charged anode. If he placed a feeble voltage on the input of this device, he found that he could get a much greater voltage at the output. This comparatively simple finding was the basis for De Forest's "audion" vacuum tube which gave such impetus to the huge modern electronic industry as we know it today, with its radio, television, radar, guided missiles, etc. Today we produce nearly a half a billion radio tubes yearly.

In 1948 there was a similar happening. About that time a small group of scientists at the Bell Telephone Laboratories, under the direction of J. Bardeen and W. Brattain, developed a device which may rank in importance with that of De Forest. In essence it is a method of controlling the flow of electrons in a solid crystal instead of in a vacuum. Although this device or transistor, as we call it, is comparatively new, the concept of controlling the flow of electrons or carriers in a solid is as old as the radio art. In the latter part of the last century it was known that certain solid materials, galena, for example, offered great resistance to the flow of current in one direction, but permitted the current to flow in the opposite direction. A little later the crystal detector emerged and was used for some years. With the advent of De Forest's Audion, the crystal detector took a back seat, only to be revived in a slightly different version for use in radar equipment during World War II.

After considerable study by some of our top scientists in universities and laboratories throughout the country on the nature of semi-conductor materials and particularly germanium, the first transistor was announced in 1948. This device was called a point-contact transistor because it was built around a block of germanium with two points (wires) or "cats whiskers" in contact with the germanium. These first units were difficult to duplicate but as time went on and more research was done, many of the initial difficulties were surmounted giving us today a reproducible transistor. A few commer-

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*Robert P. Dimmer, Project Engineer, Automatic Electric Company, Chicago, presented this talk before the Western Society of Engineers on April 1, 1953, and it is reprinted in Telephone Engineer & Management with the permission of the Copyright owner, THE MIDWEST ENGINEER.

cially available transistors are shown in *Figure* 1.

During their work on the point-contact transistor, some researchers considered a multi-contact unit where many points or surfaces would be in contact with each other. This idea led to a second type of transistor, the junction transistor, which was made public a little over two years ago. In this type of transistor two varieties of a semi-conductor material such as germanium are in contact with each other over a comparatively larger area than in the point-contact type. With a larger area to contact, it can be expected that a junction transistor will be capable of doing more work. Due to several advantages over its predecessor, the point-contact type, it appears that the junction transistor will be used in over 80 per cent of the cases where this device is considered.

To make a transistor of either type presently used we must start with a pure piece of the semi-conductor material, germanium. To determine this purity it is necessary to substitute electronic means for the less sensitive chemical analysis techniques. One part impurity in 10 million parts of germanium is still not pure enough; one part in 1 billion parts is usually too pure. The piece of germanium with this purity is not found in nature; it must be fashioned by man.

Clemens Winkler, a German chemist, first isolated this rare metal from the mineral Argyrodite in 1886. He named it after his native land. In 1871 Dmitri Mendeleev, a Russian chemist, in propounding his periodic table in 1871 predicted the discovery of this metal. He called it ekasilicon.

A large number of minerals have a trace of germanium but there is no single rich source. The chief American source has been the stacks of the zinc smelters of Kansas, Missouri and Oklahoma. A great reserve is in coal ash, particularly in England where the germanium content is quite high. Coals in the Kittanning seam in Ohio and recently a coal from Pennsylvania were revealed to have a useful percentage of this metal in their ash. One of the greatest concentrations is under Washington, D.C. In far-off Japan, Tokyo Coal Gas Co. will be able to extract 400 to 600 pounds of metal as a by-product from the one million tons of coal it will burn this year.

ROBERT P. DIMMER is a graduate of Northwestern University. He joined Automatic Electric Company in 1940, started out in Engineering Inspection, and soon was transferred to the Automatic Electric Laboratories. During the war he was concerned with engineering research on military directional finding and inter-communications equipment. In 1946 he became project engineer in the design and installation of mobile telephone systems. Now he is working on the application of transistors to the telephone field. Mr. Dimmer is a senior member of the Institute of Radio Engineers.

Extracting germanium from the ash is a very difficult job; therefore most electronic firms buy the dioxide at about $140.00 a pound. It is rather interesting to note that only ten years ago, germanium was worth $4,500.00 a pound, or nearly 9 times the price of gold. At that time the supply of this rare metal in this country was under 10 pounds. Today the price is approximately $317.00 a pound for the pure metal.

To obtain the purity required the transistor manufacturer must purify the metal further in a special furnace (Zone Refiner). By heating the metal from one end to the other, the impurities which prefer the molten liquid to the solidified state can be swept to one end of the metal. A typical view of this Zone Refiner is shown in *Figure* 2.

The pure germanium is then "doped" in a controlled process to give it the type impurity required, and made into a single crystal. A small single crystal, a "seed," shown in *Figure* 3, previously made by this or another method, is lowered until it comes into contact with the molten germanium and slowly raised. At the same time the source of heat for the molten container is slowly lowered. By using the proper lifting speed for the seed and lowering speed for the heat source, a long, single crystal is formed after a couple of hours.

While the germanium crystal is being pulled, pellets of impurities are added to the melt to make the type of germanium desired. Pellets of arsenic would make "n" (negative) type germanium, and aluminum pellets would make "p" (positive) type germanium. "N" type germanium would have an excess of negatively charged particles — electrons; "P"

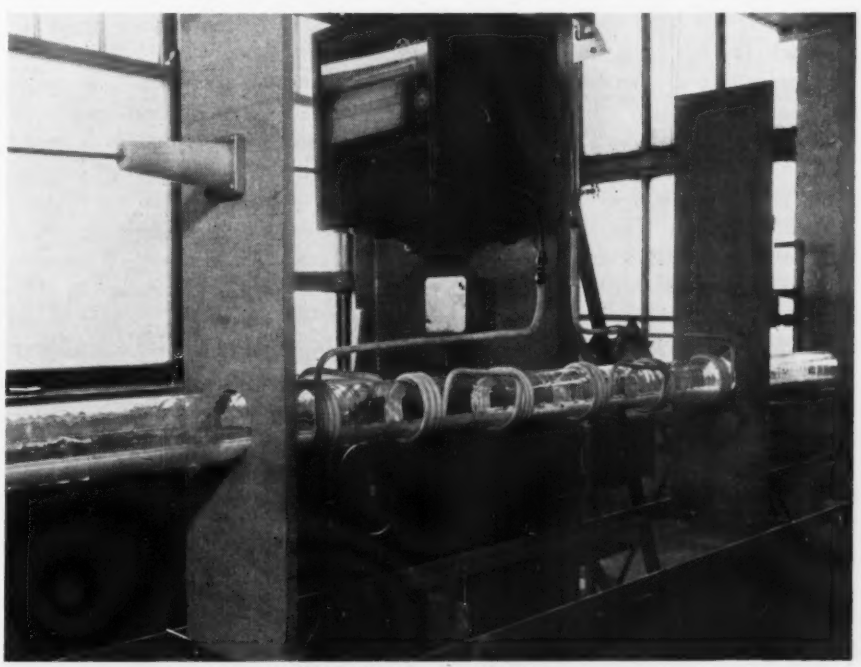


FIGURE TWO:—Zone refiner furnace

type would have an excess of positively charged particles — holes. The single crystal of germanium is then tested for its resistivity and the lifetime of its carriers, a criterion for its transistor action.

The tested crystal, which resembles a carrot in shape, is sawed in discs, and finally in small pieces approximately 1/16″ in size for use directly in transistors. With this wafer we are now able to construct a point contact transistor. The piece of germanium is usually soft soldered to a larger piece of non-reactive metal. When assembled, the two whisker points, the emitter and collector, are held in place, separated by approximately .002 inches, and pressed down on the top of the piece of germanium. These points are then molded in place.

Two Methods of Making Junction Transistors

THERE ARE TWO methods of making junction transistors: crystal growing and diffusion technique. In the crystal growing method the germanium, while it is pulled as a single crystal, is doped to produce a narrow layer of the type of impurity desired. It is also possible to make several junctions by this method by varying the pulling speed during the junction formation. In the diffusion method, a piece of germanium of one type of conductivity has melted on its opposite faces a metal of the opposite type impurity.

In discussing the operation of a point contact transistor, let us consider a unit which has n-type germanium. In this case the emitter injects holes into the germanium which drifts across the tiny distance to the collector, attracted by its negative voltage. Holes are the spaces left when an electron leaves the outer shell of an atom. The movement of these spaces or holes can conduct a current in the crystal in very much the same way that we speak of electrons conducting a current in a wire, and are usually called positive carriers. These significantly lower the resistance of the germanium immediately around the point where the collector makes contact. This action in the point contact transistor is not too well understood, although it appears as if these holes served to open trap doors to allow electrons to pour through.

For illustrative purposes let us

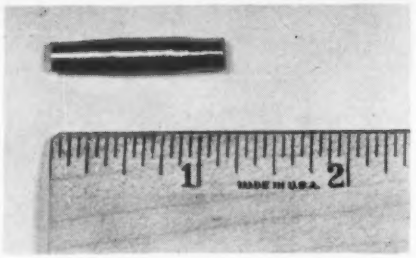


FIGURE THREE:—A typical germanium seed.

assume a signal of one million holes is impressed on the emitter; these holes will act on the collector point to allow 3.5 million electrons to flow through the collector circuit. One million of these electrons will drop into the million holes to make neutral atoms; the other 2.5 million will constitute the collector current, and in this case will represent a current gain of 2.5. In actual practice there are always free electrons and holes within the crystal that do not become involved. Considerably greater power gain is possible in the collector circuit because the collector contact offers greater resistance to the flow of current, and the work done to overcome this resistance is that much greater. This extra energy might be represented by a dam next to a full reservoir of water. A slight ripple in the water of the reservoir will cause a small amount to topple over the dam. When this small amount of water reaches the bottom of the opposite side of the dam it has considerable force and represents a gain in energy. As amplifiers, point contact transistors can boost a signal at least a hundred times. If some of their output is returned back to the input, the units can be made to oscillate.

The junction transistor is quite different in its operation and construction, although its action is based on the same semi-conductor properties of germanium. In an n-p-n junction transistor a thin layer of p-type germanium is sandwiched between two n-type pieces or zones of germanium. The outside n regions act as the input-emitter and output-collector; whereas the middle layer acts as the base or common terminal. In the operation of an n-p-n transistor, for example, electrons are injected into the germanium and flow through the thin center layer to the collector, which has a positive voltage applied to it to pull the electrons through. In a p-n-p type of junction transistor the polarity of the voltages applied is reversed, and holes are injected into the emitter instead of electrons, otherwise the operation is similar. A signal applied to the emitter or base in either case determines the quantity of electrons or holes sent to the collector region. These carriers flowing through the junctions at any instant provide the control action for current flow in the collector circuit.

Junction transistors are more stable than point contact as amplifiers, and have less noise. They operate with lower voltages than the former, and can boost a signal several hundred times more than with point contact transistors. Except in switching and certain other minor applications, it appears that junction transistors will be used more extensively than the point-contact type.

Uses For The Transistor

IN ESSENCE a transistor can do what most radio tubes do. But there is a difference in how this work is done: an electron tube controls electrons in a vacuum; a transistor controls electrons or its opposite, holes, in a solid. Since a transistor can control either positive or negative carriers, it gives us another new medium of control. One important attribute of this dual role is called complementary symmetry. By this circuit technique we can furnish sufficient energy to feed a loudspeaker with an audio amplifier consisting of only two p-n-p and two n-p-n transistors. The vacuum tube equivalent for this amplifier would require two or three tubes, several capacitors, resistors, and at least one transformer together with a power supply several times the size of the transistor power source.

One of the first and most fitting uses for transistors is in the hearing aid field. Some manufacturers have already placed on the market units incorporating 3 or 4 transistors, and operating on a single small battery. These units have the same output characteristics as the older vacuum tube models, and are able to do so with a battery life many times greater. As a result maintenance cost is reduced, and because of the single battery the units can be lighter in weight. When transistors become more available their price will undoubtedly be reduced, allowing more people to enjoy their benefits. The popular joke nowadays is that in-

stead of replacing batteries in a hearing aid, now it is necessary to replace the transistors first.

Another important application is in the auto radio field. The power economy available through using transistors made this type of radio appear promising. Present auto radios require a heavy power supply to operate the radio set tubes. By using transistors it is possible to design a set in which the 6-volt battery is the only power required. No step-up in voltage would be required. In fact, the power needed to run a radio of this type, with nominal loud speaker volume, would be no greater than that required to operate the radio set's two pilot lights.

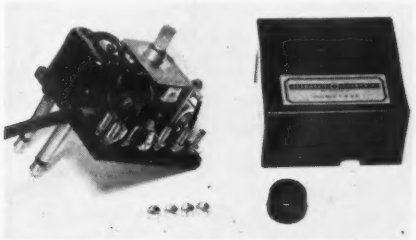


FIGURE FOUR:—Transistor amplifier for operator's headset.

In the telephone field two laboratory models of units using transistors are shown in *Figures* 4 *and* 5. *Figure* 4 shows a transistor amplifier in a plug-in arrangement connected to an operator's headset. *Figure* 5 shows a transistor amplifier (just to the right of the ringer) which converts an ordinary telephone to a hard-of-hearing phone.

A Dick Tracy transceiver built the size of a wrist watch is now a reality with the use of transistors. Transistors can also be used in oscillators, counting circuits, switching or trigger circuits, control devices, in fact, almost any place an electronic tube can be used, except perhaps as a picture tube in a television set. Like the electronic tube which developed from early diodes and triodes into a variety of forms to serve ever-widening applications, transistors can be expected to develop in their own way into a diversity of applications.

"Only when all interests are willing to permit a retreat from paternalism can normal governmental functions and expenditures be restored and the economy be insured." — Albany (Ore.) Democrat-Herald

To evaluate the future of the transistors, it might be well to cover their advantages and limitations.

ADVANTAGES:

(*a*) *Size*:—Most germanium crystals used in transistors are 1/16″ in size; therefore, it is obvious that size is one of its most important advantages.

(*b*) *Life*:—We cannot say how long they will last, but from our present experience we feel that they will eventually have a life far in excess of that of the best tubes.

(*c*) *Power Consumption*:—Their power consumption is negligible — they have no filament to heat. Their power needs are only a small fraction of tube power requirements. This means radical savings in weight and size of batteries, particularly in portable equipment. With no filament and extremely high efficiency heat output is negligible.

(*d*) *Warm Up Period*:—Since they they have no cathodes or filaments to warm up, they begin to operate the moment they are energizd.

(*e*) *Ruggedness*:—Transistors are made of a solid piece of metal encased in a body of plastic. No glass or floating parts to make them fragile.

(*f*) *Versatility*:—Certain types can control positive charges (holes) whereas other types can handle negative charges (electrons). This double action allows more versatility in circuit design.

(*g*) *Light Sensitivity*:—Without its dark enclosure the transistor junction is sensitive to light; therefore, they can be used as photocells.

LIMITATIONS:

(*a*) *Frequency Response*:—The present transistor is not too satisfactory above 10 mc. With a different design, however, some have been made that could operate as high as 300 mc.

(*b*) *Power Output*:—At this stage of development only a few power transistors are available which will give a watt or so in power output.

(*c*) *Noise*:—The noise of a transistor is somewhat higher than that of a vacuum tube; particularly the point-contact type. The n-p-n junction type has perhaps the lowest noise figure.

(*d*) *Temperature Limits*:—At the present time the ambient temperature limitation of transistors is around 80 to 100 degrees centigrade.

(*e*) *Humidity*:—It has been recently found that humidity is perhaps the worst enemy of transistors. Even when transistors are encased in plastic, they are sometimes affected. It appears likely that transistors of the future will either be sealed hermetically or be prevented from absorbing moisture by some other technique.

(*f*) *Cost*:—At the present time the cost of transistors is high. When they become available at a cost less than tubes, or when the overall use of transistors will result in lower manufacturing costs for consumer electronic equipment of satisfactory performance, then transistors will be used in large quantities. —THE END.

FIGURE FIVE:—Transistor amplifier mounted in subset for hard-of-hearing telephone.

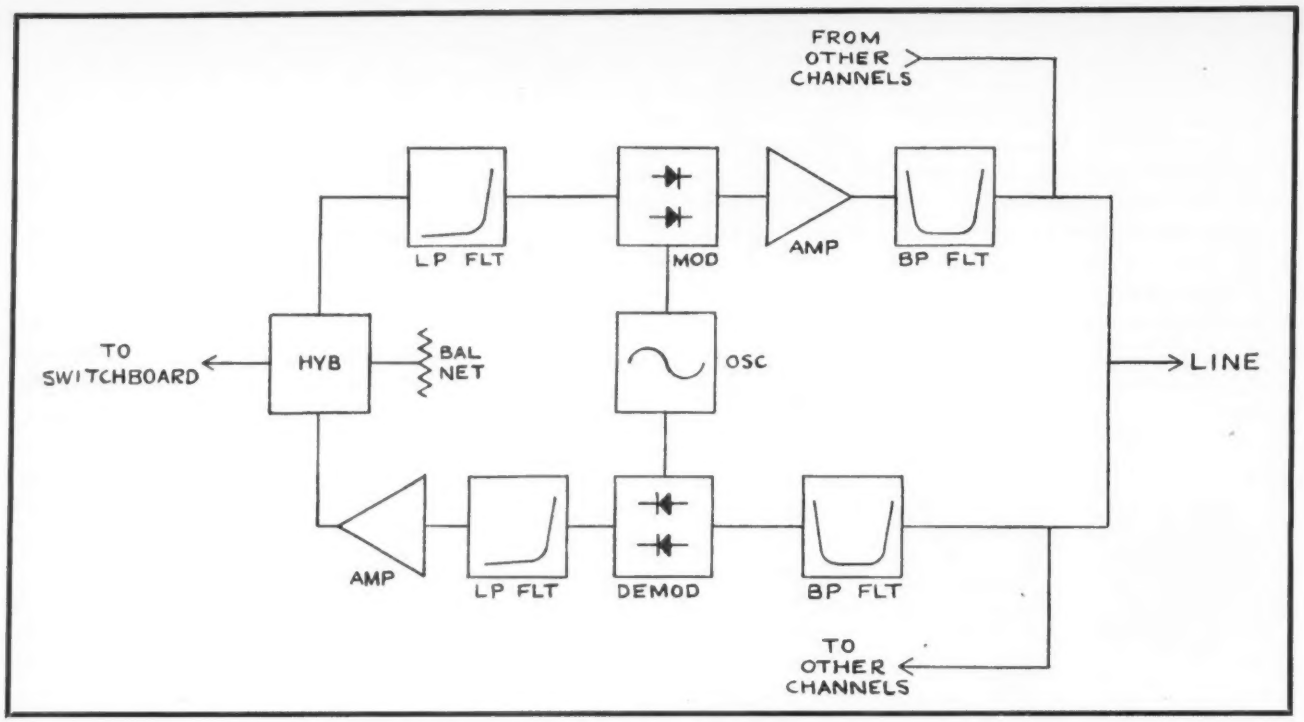


FIGURE ONE — Simplified block diagram of a typical two-wire carrier telephone channel.

MODERN CARRIER EQUIPMENT

By EDWARD G. HALL*

With this article, TELEPHONE ENGINEER & MANAGEMENT begins a new series that will thoroughly discuss and illustrate carrier equipment and systems. In this installment, Mr. Hall explains — (1) Type of Carrier, (2) The Crosstalk Problem, (3) Frequency Allocations, and (4) Cable Carrier Equipment.

CARRIER equipment for supplying many telephone circuits on a single pair of wires has been of increasing importance to the telephone industry since the end of World War II. The rising cost of pole line construction, coupled with the rising price of construction materials, has drawn new attention to carrier as a more economical method of supplying toll and exchange circuits.

Carrier systems are used to supply circuits several hundred miles in length with obvious savings in construction costs. They also have proved-in economically for circuits as short as 10 miles.

The most general use of carrier is to provide from one to 16 carrier channels on open wire lines.

Other applications are in cable circuits where 12 or 24-channel systems are used, and in radio multiplexing systems where the number of circuits supplied may vary from three or four to as many as 360 or more.

Types of Carrier

AMONG THE types of carrier in use are frequency modulation types and amplitude modulation systems using either single sideband or double sideband transmission. The carrier frequency for each channel may be transmitted or suppressed.

Single sideband carrier systems require narrower bandwidth for each channel, permitting the application of more channels of carrier within the frequency spectrum space most adaptable to wire line carrier transmission. This often results in less stringent line requirements for a given number of channels. Thus a line transposed for 35 kilocycle transmis-

* ***Mr. Hall is manager of the Sales Engineering Department of The Lenkurt Electric Co., San Carlos, Calif.***

sion can be used to carry four single sideband carrier channels since they require only 4 kc per channel for each direction of transmission.

Suppression of the carrier provides two advantages. First, less power is transmitted on the line. This permits the use of amplifiers with less stringent load handling capabilities, particularly where multi-channel systems are used. Second, elimination of the carrier reduces the possibility of inter-channel interference from modulation resulting from non-linearities in the wire line due to high resistance splices.

The principle of frequency division carrier systems lies in the division of the transmission bandwidth into separate bands by means of filters. Each of these separate bands corresponds to a carrier channel. This is somewhat similar to commercial radio broadcasting in which each station transmits on a separate frequency allotted to it within the commercial broadcast frequency spectrum.

In carrier systems, voice frequency intelligence first is limited to about 3000 cycles by means of low-pass filters. This intelligence then is translated to a 3000-cycle band at some higher frequency for transmission on the line. At the receiving terminal, the intelligence is retranslated to voice frequencies, still in the 3000-cycle band, and sent on to the switchboard.

The translation is accomplished by modulation of separate carrier frequencies with the voice frequency intelligence.

Included in the transmitted direction of the carrier system are amplifiers to provide the necessary sending level to the line for transmission. Automatic level regulators often are included as part of the carrier receiving branch, in addition to amplifiers, to keep the received signal at the proper level in spite of changes in the attenuation of the line caused by changes in temperature or by rain or sleet.

A simplified block diagram of a typical channel of carrier equipment is shown in *Figure One.*

The Crosstalk Problem

ONE OF THE major considerations in the design of carrier systems is the problem of crosstalk. This crosstalk may originate within individual systems or may be the result of inter-action between two or more systems operated on the same pole line or lead.

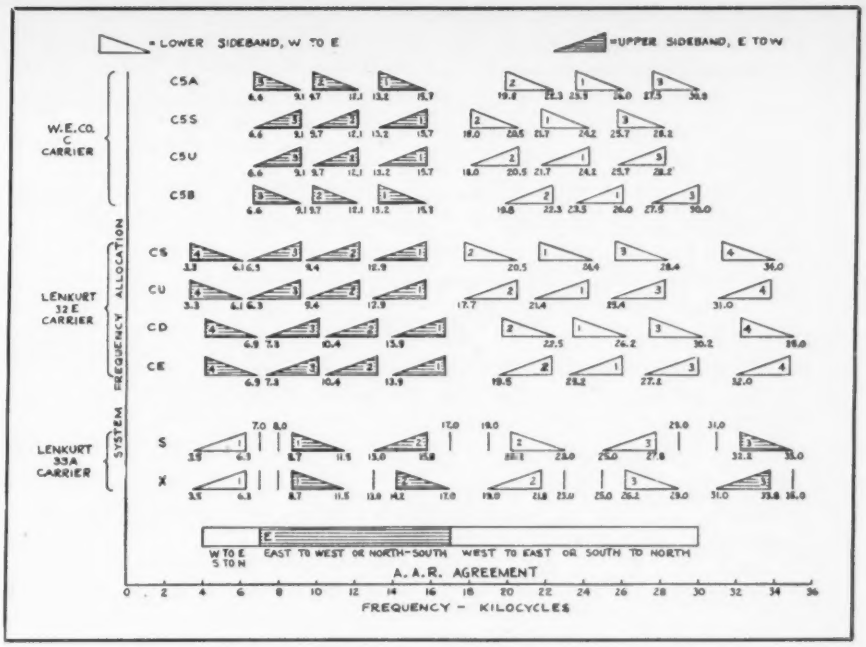


FIGURE TWO — Allocation plans of three 35-kc open wire carrier systems.

Crosstalk which might occur between channels within the same system can be prevented by good filter design.

Crosstalk resulting from inter-action between systems must be met by proper line transpositions and equipment designed to "coordinate" with other systems to prevent intelligible crosstalk and reduce unintelligible crosstalk. Such coordination is achieved through control of channel frequency allocations and transmission levels.

Two factors in frequency allocation contribute to control of crosstalk.

First is the inversion of channels with respect to the sideband transmitted. Since either upper or lower sidebands may be used, one system may be assigned the upper sideband and the second system the lower sideband. Any crosstalk which might result from interaction between these systems then would be unintelligible.

The second method of controlling crosstalk in frequency allocations involves staggering the channel transmission frequencies. These frequencies are shifted to place the 1000-cycle point of each channel outside the pass band of the corresponding channel in adjacent systems. This is illustrated in *Figure Two* where, for example, a 1000-cycle signal in the second east-to-west channel of a Type 33A S allocation will appear as 14 kc on the line. This frequency will not be accepted by the filters of the corresponding channel 2 of the X allocation for which the pass band is from 14.2 to 16.7 kc.

Levels also must be controlled in design of coordinating systems.

Levels of one system measured at any point on the line should be approximately equal to those of a coordinating system measured at the same point. Otherwise the crosstalk coupling loss between pairs will be reduced by an amount equal to the level difference.

Basic Frequency Allocations Used In United States

THE BASIC frequency allocations used in the United States are largely due to the carrier development program and growth pattern of the Bell System. Work on allocation standards has been carried out by the Association of American Railroads. International standards which are followed in most countries other than the U.S. and Canada have been established by a committee of the International Telecommunications Union generally known as CCIF.

Open wire carrier systems almost universally are operated on a two-wire basis. That is, only two wires (a single pair) are used for both directions of transmission. Different frequencies must be used for opposite directions of transmission. This is reflected in all two-wire allocation plans with east-to-west and west-to-

east directions confined to specific parts of the frequency spectrum.

In general there are three basic frequency allocations for all open wire carrier systems. They differ primarily in the number of channels in the allocation. The first is for systems providing up to four channels; the second is for systems with up to 12 channels which are applied to lines already containing three or four-channel systems; the third, a comparatively new allocation, is for systems which provide a maximum of 16 channels in groups of four. The first allocation requires transmission frequencies up to 35 kc and the second and third allocations require frequencies up to 150 kc.

A number of different carrier systems are now being produced for telephone use, but not all of them are designed to coordinate or "live with" other systems. Space limitations make it impossible to discuss all of them in this article. As examples, therefore, typical coordinating systems will be cited. These are:

Allocation Group I: —
1. **Western Electric Type C**
2. **Lenkurt Type 32E**
3. **Lenkurt Type 33A**

Allocation Group II: —
1. **Western Electric Type J**
2. **Lenkurt Type 45A**

Allocation Group III: —
1. **Western Electric Type O**
2. **Lenkurt Type 45C**

The system allocations for the three types in the first group are shown in *Figure Two*. Each of these systems is for application to 35 kc lines and all will coordinate on the same lead.

The first system listed above provides three channels with the equipment designed for installation of these channels in a group. The second system is nearly a direct equivalent except that a fourth channel may be added as circuit requirements dictate. Frequencies of the two systems are identical for each of the channels in two of the four system allocations. In the other two allocations, the west-to-east allocations are the same but a different method of coordination is used in the east-to-west allocation. In one of the systems the CD and CE allocations provide for staggering of

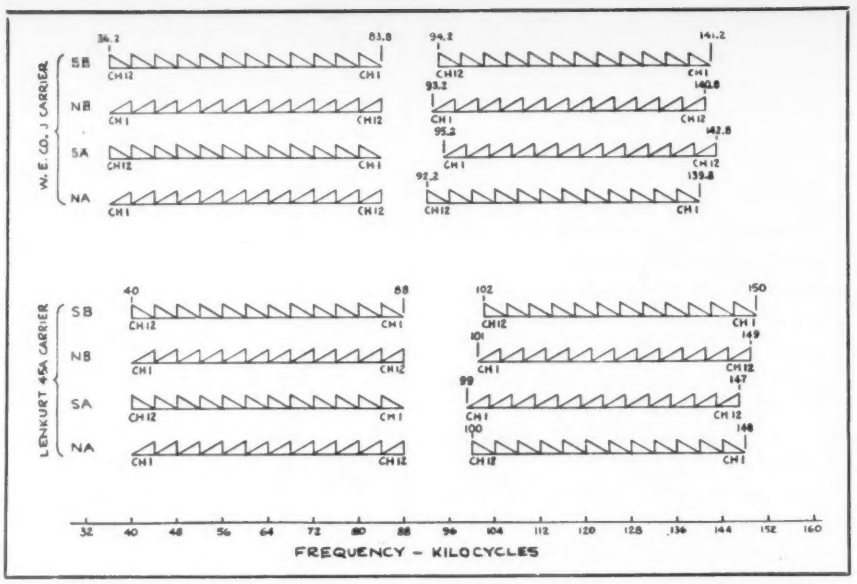


FIGURE THREE — Allocation plans for two 12-channel open wire carrier systems.

channel transmission frequencies while in the other the channels are inverted.

In Type 32E equipment, advantage is taken of the unused portion of the low end of the allocation to provide east-to-west transmission of another, or fourth, channel. The west-to-east frequencies for this fourth channel are assigned at the high end of the 35 kc spectrum, above the highest frequency used in C systems or the three-channel 32E.

The third system in this 35 kc coordinating group is a "building block" type which provides up to three channels that may be added one at a time without need for common equipment except power supplies. Channel allocations use the lowest possible frequencies for each channel. Thus, the first channel frequencies all are below 11.5 kc, the second channel below 23.0 kc, and the third channel below 35.0 kc.

This system allocation plan provides for coordination with the other two systems, since directions of transmission are the same in each part of the frequency spectrum shared by the three systems. The west-to-east part of the first channel lies outside the spectrum of the 32E and C systems, as does the east-to-west part of the third channel of 33A. With this type of allocation, it is possible to assign the lowest frequencies to each channel as it is added to the line.

When a larger number of channels than four is required, it generally is necessary to utilize equipment in the 150 kc category, although it is not necessary in every case to use frequencies that high or to provide line facilities for such frequencies.

Both systems listed in the second allocation group have a maximum capacity of 12 channels and are designed to operate on the same pair with the previous systems described. This permits a maximum of 16 carrier channels on a single pair using

EDITOR'S NOTE

The second article in this important series of educational articles on the basic aspects of carrier, will discuss "Line Requirements For Carrier."

Other subjects scheduled for discussion in succeeding issues of Telephone Engineer & Management include:

(1) Measuring a Line For Carrier Applications.

(2) Methods of Suppressing Crosstalk — Compandor, Staggering, Inversion, Transposition, Frogging.

(3) Explanation of dba, dbm, dbRN, and db.

(4) Levels and Powers in a Carrier System.

(5) Testing and Test Equipment For Carrier.

(6) Line Filters On Carrier Circuits.

(7) Drop-Channel Operation.

Your comments on the first article will be appreciated. If you have other subjects that you would like discussed — let us know.

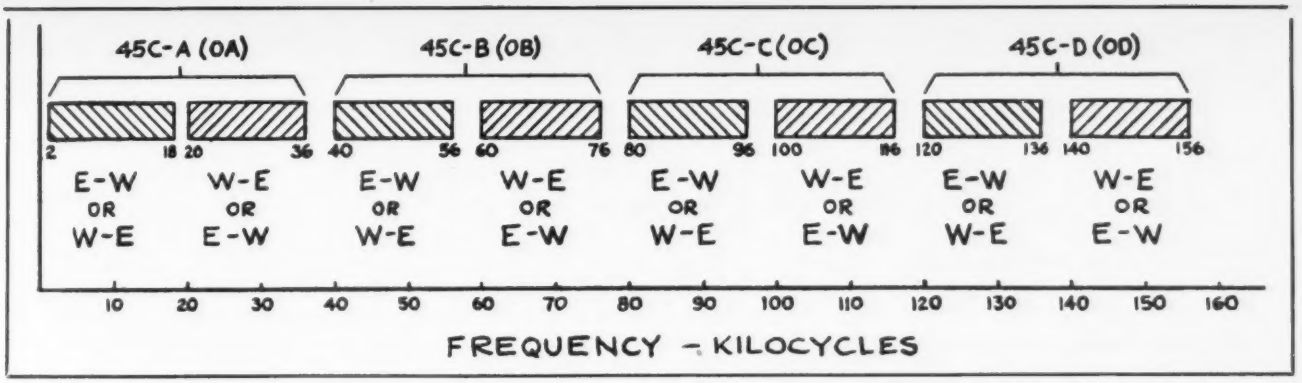


FIGURE FOUR — Frequency allocations of Lenkurt 45C and Western Electric Type O systems. Four groups of four channels.

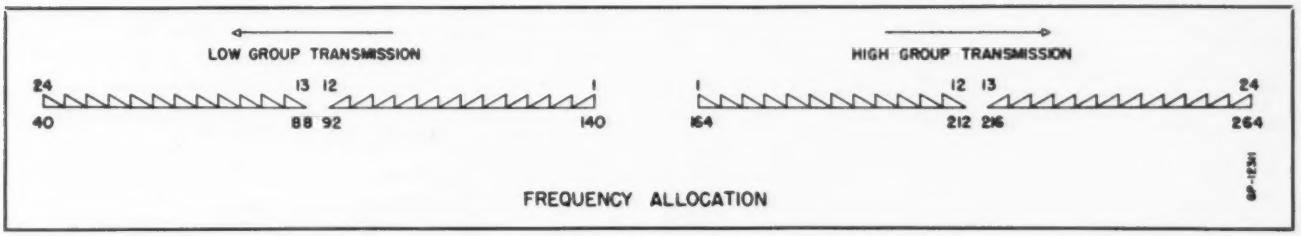


FIGURE FIVE — Frequency Allocation, Type 45B carrier system for cable applications. Twenty-four channels are obtained on two cable pairs.

a four-channel system and a 12-channel system.

The system allocations used are shown in *Figure Three*. Both are available in four separate allocations. These different allocations provide crosstalk advantage through inversion and/or staggering of frequencies. Use of these different allocations for systems operating on one open wire lead provides effectively several db of inter-system crosstalk advantage.

These systems will coordinate for use on the same lead and both are capable of long-haul service such as required for main trunk routes in the nation-wide toll switching plan. The 45A also is suitable for short-haul applications on circuits as short as those in exchange service.

The third basic allocation, recently adopted, is that used to provide 16 channels in one system. The two systems designed for this allocation operate in the frequency range from 2 to 150 kc. These systems are made up of groups of four channels. Where three or four-channel systems already are in service on a pair, the first group of four channels is omitted from the system and the first group to be applied then would be the second of the system. The allocation plan used in these systems is shown in *Figure Four*. Because of the four-channel grouping arrangement, these systems normally cannot be used on

The author of "Modern Carrier Equipment" is E. G. HALL, manager of the Sales Engineering Dept. of the Lenkurt Electric Co.

open wire leads already carrying 45A or J systems. In effect, they do not "coordinate," level-wise or frequency-wise.

Cable Carrier Equipment

CARRIER systems are used extensively on cable pairs, and a number of systems have been designed for this application. Cable carrier equipment ordinarily is designed for four-wire operation. That is, separate pairs are used for each direction of transmission. In some applications, where the same frequencies are used in each direction of transmission, the pairs used are in separate cable sheaths to provide the necessary isolation. *Figure Five* shows the frequency allocation of a cable system designed to provide a maximum of 24 cable channels over two cable pairs in the same sheath. It utilizes the same frequency spectrum as the Western Electric 12-channel double sideband N system and is designed to coordinate with the N system even though 24 channels are available in the same spectrum that the N uses for 12 channels.

In addition to carrier systems for open wire lines and cable, carrier equipment has been designed to provide hundreds of channels over special coaxial cables.

Radio equipment has found increasing application in the telephone industry. The type most common to the general public is the Western Electric Type TD-2 used for trans-continental television circuits and toll trunks.

In addition to this system, however, there are a number of radio systems designed to transmit 12 to 72 voice frequency channels for short and medium-haul circuits. Frequency division carrier systems like those described above are used with this radio equipment.—THE END.

THE LITTLE WHEEL

"Make no mistake — our little wheel is important. It has many years of service to the community and the nation."

BY RUTH E. RICHARDS

Methods Supervisor,
General Telephone Co. of Illinois
Springfield, Illinois

THIS SOUNDS LIKE the storybook title of a tale to be read by a child, doesn't it? But make no mistake, our little wheel is truly an important one with many, many years of service to its community and the nation and we telephone folks know it as the tributary telephone exchange.

In choosing a title for this article which we hoped would intrigue you and at the same time illustrate the various points to be emphasized, we borrowed from the negro spiritual, "Ezekial saw the wheel — way up in the middle of the air — the big wheel run by faith, 'n the little wheel run by the Grace of God — a wheel within a wheel." That the small office may learn to run more smoothly by the grace of better understanding and knowledge — we term it the "little wheel," or "the wheel within a wheel." That wheel has tremendous power. It helps turn many big wheels that keep communications in this country efficient.

Since the traffic items we plan to cover in this department are those which interest yet confuse people in small offices, such as tributaries, let's first find out more about our "little wheel," by discussing *"what is a tributary"?*

Before you came into the telephone business you probably thought of a tributary in terms of schoolday definitions, as a stream which pours its waters into a large stream or river, such as the Illinois which flows into the Mississippi.

Literally and briefly a tributary, from the word "tribute," is one who contributes, as a tributary telephone exchange contributes all or part of its toll traffic to its center for toll, or as we say, toll center, for handling. It is to those tributaries who contribute only a part of their traffic to their toll centers that we direct most of this article, the partial tributaries who route a portion of their traffic over independent lines and ticket and time the calls.

During the past two years the Illinois Telephone Association Traffic Committee has sponsored a series of toll center-tributary meetings which have been held in various toll centers throughout the state of Illinois. The purpose of these meetings has been to foster a better understanding of common problems and to acquaint tributary operators with new operating practices as well as give satisfactory answers to questions concerning existing practices.

Some of the most frequently repeated questions were those relative to collect station to station calls to nearby points, ticket entries on calls charged to a third telephone,

Meet Ruth E. Richards

IN THIS ISSUE the editors of Telephone Engineer & Management proudly start a new feature — *a series of articles devoted exclusively to Traffic Department methods and routines.* To author the new feature your editors selected *Ruth E. Richards*, Methods Supervisor of the General Telephone Co. of Illinois, Springfield.

Miss Richards describes herself as a "*gal of* 50 *who has* 36 *years of experience behind her.*" She started her telephone career in 1917 as an operator at Valparaiso, Ind., for the Northwestern Indiana Telephone Co., predecessor company of General Telephone Co. of Indiana. She was 14 years old (pre-labor law days) and "put up" her braids in order to appear older. As time went on she became a central office supervisor and toll instructor. During 12 years as a night operator, she completed formal schooling in evening classes and learned the "Toll Operating Practice" through interested study. In 1940 she was appointed Traffic Supervisor attached to the general office of the company at Lafayette, and working as a field supervisor in all of the company exchanges in Indiana. Her job responsibilities included the training of chief operators and central office supervisors, special traffic studies, and the promotion of management policies.

In 1948, Miss Richards transferred to General Telephone Co. of Illinois at Springfield as a Traffic Supervisor in the general office, with force adjustment work as her major responsibility. In 1950 her title was changed to Methods Supervisor. Her field work activities cover most phases of central office traffic management in a training and advisory capacity to District Traffic Supervisors.

Enterprise service, and the puzzling aspects of information service at toll center exchanges.

We've used a wheel (*Figure One*) to illustrate the items to be covered, and divided it, one half dealing with circuits, the other calls. The spokes represent different items which seem to be the least understood by the most operators.

Recognize that the operating practices which are outlined here are simplified versions of standard Bell toll operating practices.

Circuits and Routings

MANY THOUSANDS of dollars have been invested in toll lines and improper use of them means loss of revenue and slower toll service. Since many companies are experiencing heavier toll business coupled with too few toll circuits, it follows that the most efficient use must be made of the circuits which are available. Because there are so many different companies in the telephone industry and in order to give toll service to all towns and villages, it is necessary that toll calls be routed on other companies' circuits as well as over our own. These companies are entitled to payment for the use of their circuits. In general, all telephone companies have agreements with the other companies whose lines they use. These contracts are called "Traffic Agreements" and they outline the circuits involved, show the number of miles of circuit owned by each company and the settlement terms.

From these traffic agreements routing instructions are prepared, generally by the accounting company, and furnished to the exchanges affected. These are the authorized routings for each exchange and should be strictly followed. The number of messages which a circuit or group of circuits can carry is termed "capacity of the group" and routings are authorized to provide the number of calls which the group can carry satisfactorily.

Each time a toll call is routed by guess, or because an operator knows that *Littletown* has a circuit to *Otherplace* that she can use, someone is being cheated out of rightful payment for valuable circuit time, and possibly a "no

Please Turn To Page 58

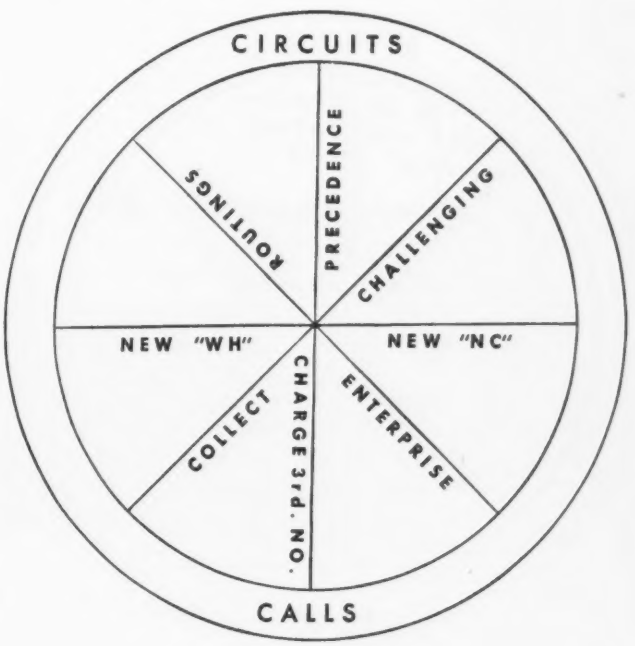


FIGURE ONE

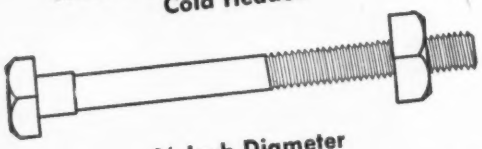
Joslyn Machine Bolts

Hot Dip Galvanized

Rolled Threads—Square Heads and Nuts

Made to E.E.I. Specification TD-1

Cold Headed



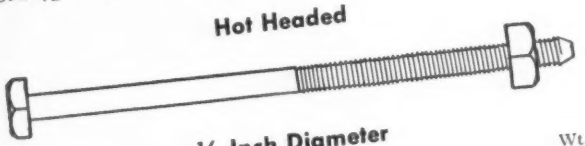
⅜-Inch Diameter

No.	Lgth. In.	Lgth. Thrd. In.	Wt. Lb. per 100
J8603	3	1	13.0
J8603½	3½	3	15.0
J8604	4	3	16.2
J8604½	4½	3	16.4

½-Inch Diameter

No.	Lgth. In.	Lgth. Thrd. In.	Wt. Lb. per 100
J8703½	3½	3	28.6
J8704	4	3	29.0
J8704½	4½	3	34.0
J8605	5	3	19.0
J8605½	5½	3	19.4
J8606	6	3	21.3
.....	...	..	....
J8705	5	3	36.0
J8706	6	3	42.0
.....	...	..	....

Hot Headed



½-Inch Diameter

No.	Lgth. In.	Lgth. Thrd. In.	Wt. Lb. per 100
J8707	7	4	47
J8708	8	4	50
J8709	9	4	56
J8710	10	4	60
J8712	12	6	64
J8714	14	6	80
J8716	16	6	87
J8718	18	6	98
J8720	20	6	109
.....	..	..	...

⅝-Inch Diameter

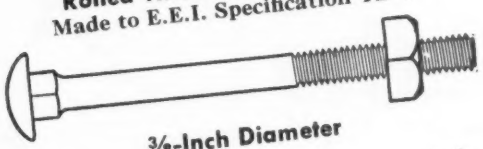
No.	Lgth. In.	Lgth. Thrd. In.	Wt. Lb. per 100
J8806	6	3	67
J8807	7	4	74
J8808	8	4	82
J8810	10	4	100
J8812	12	6	116
J8814	14	6	132
J8816	16	6	146
J8818	18	6	162
J8820	20	6	178
J8822	22	6	192
J8824	24	6	208
J8826	26	6	222
J8828	28	6	234
.....	..	..	...

Joslyn Carriage Bolts

Hot Dip Galvanized

Rolled Threads—Square Nuts

Made to E.E.I. Specification TD-1



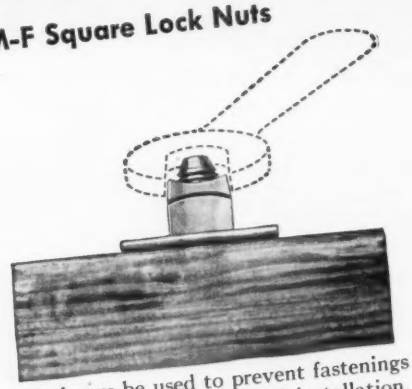
⅜-Inch Diameter

No.	Lgth. In.	Lgth. Thrd. In.	Wt. Lb. per 100
J8633	3	1¾	13.0
J8633½	3½	1¾	15.0
J8634	4	1¾	16.0
J8634½	4½	1¾	17.1

½-Inch Diameter

No.	Lgth. In.	Lgth. Thrd. In.	Wt. Lb. per 100
J8644	4	3	32.5
J8644½	4½	3	33.0
J8645	5	3	36.0
J8635	5	1¾	20.0
J8635½	5½	1¾	20.2
J8636	6	1¾	21.1
.....	...	...	....
J8645½	5½	3	38.0
J8646	6	3	41.5
.....	...	...	....

Joslyn M-F Square Lock Nuts



M-F lock nut should always be used to prevent fastenings from loosening and to complete a static-proof installation. Used in conjunction with a regular nut forming a solid unit which cannot loosen no matter to how much vibration it is subjected. Turns on bolt with free fit, and when it touches the nut takes ½ to ¾ turn of wrench to flatten concave surface bonding it to the thread. No special wrench required. This nut is a solid piece of rolled steel and can be removed from bolt with wrench; however, vibration cannot shake it loose. Standard with most railroads for car bolts.

Hexagon nuts available on special order.

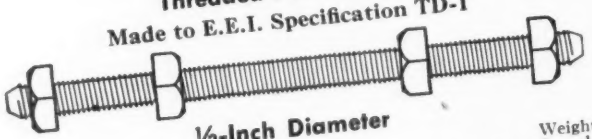
No.	Bolt Size Inches	Width Inches	Thickness Inches	Weight Pounds per 100
J8581	⅜	⅝	¼	1.5
J8582	½	13/16	19/64	2.5
J8583	⅝	1	⅜	4.5
J8584	¾	1⅛	7/16	6.4
J8584½	⅞	1 5/16	15/32	9.3
J8585	1	1½	15/32	14.0

Joslyn Double Arming Bolts

Hot Dip Galvanized

Threaded Full Length

Made to E.E.I. Specification TD-1



½-Inch Diameter

No.	Length In.	Weight Pounds per 100
J8842	12	86
J8844	14	95
J8846	16	104
J8848	18	113
J8850	20	124
J8852	22	135
J8854	24	148
.....	..	...

⅝-Inch Diameter

No.	Length In.	Weight Pounds per 100
J8862	12	135
J8864	14	152
J8866	16	168
J8868	18	186
J8870	20	196
.....	..	...

NOTE: Larger sizes and larger diameters can be furnished on request.

Joslyn Flat Head Stove Bolts

Hot Dip Galvanized

For fastening porcelain knobs and brackets.

No.	J8232	J8233½	J8243	J8245½
Size.....inches	5/16x2	5/16x3½	⅜x3	⅜x5½
Weight per 100..pounds	6	8	11	17

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PAGE 12 FROM THE LEICH CATALOG

LEICH SUPPLY SERVICE

From a package of wood screws to a carload of wire, you can depend upon Leich supply service.

We do our level best to have your tools and materials where and when you want them. We carefully select and test Leich supply items. Everything is of the best quality we can find. *Everything* is guaranteed.

Look through your Leich supply catalog (the one with the bright yellow cover). You'll find everything you need. And when you holler . . . we'll come a-running. Leich Sales Corporation, 427 W. Randolph, Chicago 6, Ill.

MANUFACTURERS OF TELEPHONES, SWITCHBOARDS AND RELATED APPARATUS SINCE 1907

circuit" condition is being created for some operator who should have use of the line.

A great deal of circuit time may be saved by speedy answers to Inward signals and by prompt reports to calling operators. Supply the called number on calls passed to you by name (the calling operator must have the telephone number on her ticket) and if the number does not answer, pass a "DA" report at the end of *one* minute. Remember, the circuit time you help to save will be time available for completing your calls. Supervise connections closely; watch for disconnect signals and disconnect promptly.

Precedence and Challenging

HAVING ACCEPTED a call from your customer your next move is to secure a circuit. If you have a circuit you will proceed without delay, but suppose that just as you pick up what appears to be an idle circuit you encounter an operator on it. The operator having a call, order, or report of higher class or an earlier precedence time is entitled to use the circuit. Perhaps you say, "what is a call of higher class?"

In order of precedence (right of first usage) by different classes we list: (1) Emergency calls; (2) cut-offs, better connection, wrong number; (3) overseas, conference; (4) WH reports; and (5) all other calls or attempts.

To determine your right to use the circuit, announce your precedence by saying "My time is ....." or if it takes class precedence, say "This is a 'WH'," or explain that you are using the circuit for more than one call, or if you have built up a circuit through two or more operators in two or more cities say," I have MX precedence." Be guided by the other operator's reply.

Understand that this challenging procedure applies only on an available circuit. It does not apply when you answer a line signal or recall signal. After answering a signal proceed with the order received.

It is misunderstanding and misuse of these procedures which cause a great deal of operator difficulty on circuits. Make sure that you know what to do, when to yield, and when to stand firmly behind your request.

Collect Tickets — Rate 35 cents or less

THE COLLECT CALL IS a convenience for the customer, but it does require special care in handling and rating. The first "must" in preparing a collect ticket is that the calling and called places names *be written in full.* Remember that collect calls are billed to customers in distant towns by accounting departments that may not be familiar with local abbreviations. A call that cannot be billed means lost revenue.

In rating collect tickets special care should be taken to use the correct rate. An obsolete conception of collect station rates continues to flourish in the thoughts of some operating people, (particularly those spoken of as old-timers) namely, that "a collect call takes a person rate." Erase this idea from your mind. Remember that in the lower rate brackets, the collect station-to-station rate is different from the paid-station rate, and may be different from the person rate, either in the initial rate amount or in the overtime rate or both. In the case of collect calls to out-of-state points where the distance is 24 miles or less, the initial period also differs between collect station calls and person calls.

Effective October 1, 1953 certain interstate (out-of-state) rate changes were authorized by the Federal Communications Commission. The changes involve certain night and Sunday initial rates and some overtime rates. The method of computing collect rates was changed for calls in the lower rate brackets. The charge for a collect station call — paid rate 25 cents or less — includes a flat charge for the special handling required. This flat charge is added to the regular paid rate charge for the number of conversation minutes.

If you have particular items you would like covered in future articles — let your "Teleprone Engineer" editor know.

EXAMPLE OF INTERSTATE RATE TABLE

Rate	DAY, NIGHT AND SUNDAY				
	STATION TO STATION			PERSON TO PERSON	
	Paid		Collect	Paid and Collect	
Mileage	Initial	Overtime	Amount to be added to charges computed on a paid basis	3 Mins.	Add'l Mins.
1- 8	.10-4M	.05-2M	.15	.25	.05
9-13	.15-4M	.05-2M	.15	.30	.05
14-18	.20-4M	.05-1M	.10	.35	.05
19-24	.25-4M	.05-1M	.05	.40	.05

Special Reverse Charge Toll Calls (Enterprise)

MANY TELEPHONE companies provide a special service to subscribers which permits them to receive incoming toll calls for which they will pay, without the calling customer requesting reversal of the charge. For this purpose the subscriber is assigned a special number in addition to his regular number. In many areas this special number carries as a prefix the word "Enterprise."

Increasing use is being made of this service by power companies and other businesses serving suburban and rural communities. Small office operators are receiving requests for these special numbers (Enterprise) and often are confused by the ticket entries and rate requirements. (*See Figure Two.*)

Enter the special number in the "To Tel. No." space, the regular number in the "Spec. Inst." space, "Col." in the collect space, and "Spec." in the accepted space. Understand such calls are accepted only on a station-to-station basis and you do not try to secure acceptance of the charge, (that is the purpose of the pre-arranged service) and the call is rated at the paid-station rate. The ticket is forwarded for billing in the same manner as a regular collect call.

Calls Charged to a Third Telephone

THE INSTRUCTION — "Charge this call to my office, operator," sounds familiar, doesn't it? The request to charge a call to a telephone other than the ones between which conversation is held is often made and such a call is not classed as paid or collect but as "charged to a third telephone." A charge may be transferred to a third telephone if the day-station rate to that telephone from either the *calling* or *called* telephone is 45 cents or less, provided the third telephone is not a coin station, and will accept the charge when reached. Such a request may be received from either the calling or called party. (*See Figures Three and Four.*)

TICKET ENTRIES:—Enter in the "from" and "to" spaces the numbers between which the parties will talk, as on a paid call, and enter "bill to (pl. and tel. no. of third tel.)" in the "Spec. Inst." space. When the charge is accepted by the third telephone, enter "OK" following the number in the "Spec. Inst." space. *Do not* mark the ticket collect. If "Col." and "Yes" were previously entered, draw a line through these entries. Write *in full* the names of the calling place and Central Office, the called place and Central Office, the third telephone place and calling office. Following conversation, encircle the entry in the "Spec. Inst." space in green, to call attention to it for billing and draw a line through the entry in the "From Tel. No." space, as a precaution against the call being billed to that number.

HANDLING OF THE CALL: — If the call is not from a paystation or hotel proceed as on a paid call. After conversation has started reach the third telephone and secure acceptance of the charge. A phrase such as follows may be used, "This is Long Distance, Mr. (Clg. pty.) at (pl. & No.) is calling (or 'has just talked') with (cld. Pl.) and wishes you to pay for the call. Will you accept the charge?" If delay is encountered in reaching the third telephone make attempts in accordance with the usual schedule of attempts. If the charges are not accepted at the third telephone, or the telephone is not reached after a suitable number of attempts, tell the party who requested the transfer that you cannot transfer the charge, or that the charge was not accepted, and explain that it will be necessary to bill the charge to him.

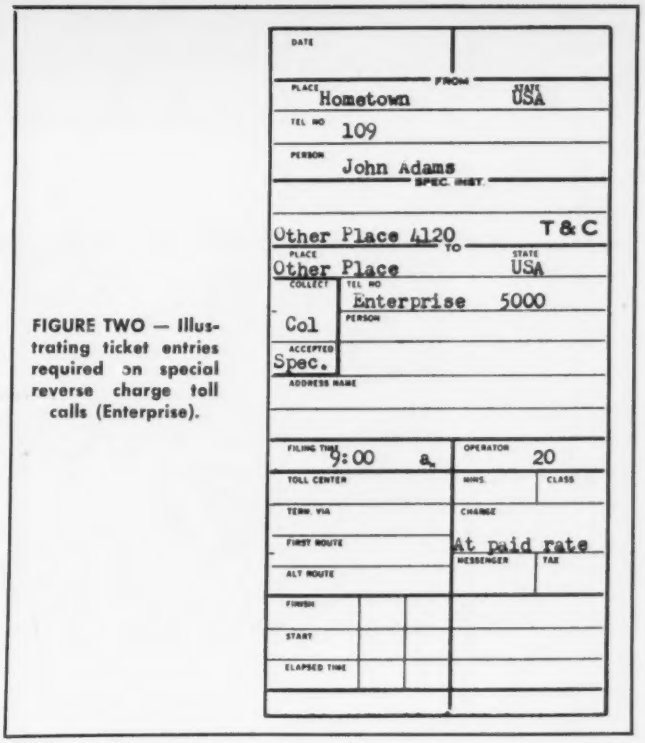
DATE
PLACE Hometown FROM STATE USA
TEL NO 109
PERSON John Adams
SPEC. INST.
Other Place 4120 T&C
PLACE Other Place TO STATE USA
COLLECT Col
TEL NO Enterprise 5000
PERSON
ACCEPTED Spec.
ADDRESS NAME
FILING TIME 9:00 a.
OPERATOR 20
TOLL CENTER
MINS. CLASS
TERM. VIA
CHARGE At paid rate
FIRST ROUTE
ALT ROUTE
MESSENGER TAX
FINISH
START
ELAPSED TIME

FIGURE TWO — Illustrating ticket entries required on special reverse charge toll calls (Enterprise).

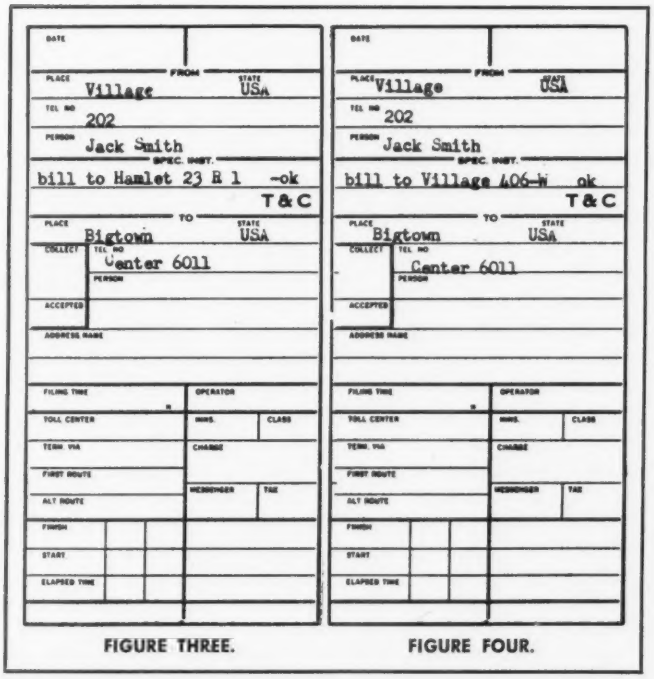
DATE
PLACE Village FROM STATE USA
TEL NO 202
PERSON Jack Smith
SPEC. INST.
bill to Hamlet 23 R 1 -ok
T&C
PLACE Bigtown TO STATE USA
COLLECT
TEL NO Center 6011
PERSON
ACCEPTED
ADDRESS NAME
FILING TIME
OPERATOR
TOLL CENTER
MINS. CLASS
TERM. VIA
CHARGE
FIRST ROUTE
ALT ROUTE
MESSENGER TAX
FINISH
START
ELAPSED TIME

FIGURE THREE.

DATE
PLACE Village FROM STATE USA
TEL NO 202
PERSON Jack Smith
SPEC. INST.
bill to Village 406-W ok
T&C
PLACE Bigtown TO STATE USA
COLLECT
TEL NO Center 6011
PERSON
ACCEPTED
ADDRESS NAME
FILING TIME
OPERATOR
TOLL CENTER
MINS. CLASS
TERM. VIA
CHARGE
FIRST ROUTE
ALT ROUTE
MESSENGER TAX
FINISH
START
ELAPSED TIME

FIGURE FOUR.

No Circuit Conditions

NO CIRCUIT, or "nc" conditions are experienced in all exchanges to some extent, but knowledge and use of currently authorized practices will insure less delay and annoyance to customers. Early in 1953 revised "nc" practices were made effective, but there appear to be many exchanges still in doubt as to correct procedure. Briefly, the revised practice provides that on an "NC" out of your office you will hold your customer one full minute while waiting for a circuit before giving a report, "The circuits are busy now, I will call you." Hold the calling line 10 minutes watching for a circuit. If still "nc" at the end of 10 minutes give another report, continue to watch for a circuit and give reports to your customer every 20 minutes until the condition changes.

If "nc" is encountered at a direct-circuit point, hold customer one full minute before giving the report, making two attempts at 30-second intervals. Give the report to customer as outlined above. Make further attempts at 5-minute intervals for two hours, giving "nc" reports to your customer every 20 minutes. If still "nc" at the end of two hours you may leave a circuit request (the term "circuit request" replaces "call order" and "NC Memo")

Please Turn To Page 62

Monophones sound m

...much better—even on long lines!

Type 40 Monophone — Distinguished for Superior Transmission

Let's face it. There's only one thing your subscribers expect a telephone to do: to **sound clear**—all the time, everywhere. Type 40 Monophones DO—even over long, noisy loops. And subscribers show their appreciation by extra use, and by warm friendliness toward the company that installs them!

Why is this so? Because we designed Monophones with high effective transmission **foremost in mind.** They are made to transmit a greater proportion of the high frequencies than the low to compensate for cable attenuation at these frequencies. Their damped transmitter and receiver diaphragms permit uniform response over the entire voice scale. Their high transmitter output insures that speech level will always exceed noise level, even on relatively long lines. All these features, plus the Type 51 uniform-impulse dial, enable you to provide better service far out, and to use smaller-gauge, more economical cable.

To prove our point, we suggest you talk to a man who has bought Type 40 Monophones. And try one yourself. You'll be so pleased you'll specify Monophones the very next time you order!

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by saying, "Call Operator (TX No.) at (your office)." Precedence time will be the filing time on the initial attempts to complete, or the "ag" time on a call being tried after having been held because of station or party delay, or at the calling party's request.

MX PRECEDENCE: — If you receive an "nc" report after passing an order to two or more operators, in two or more cities, request MX precedence, by saying, "MX precedence, this is (your office)." If you are asked to hold, do so. Cut out and give an "nc" report to the calling party. If at the end of five minutes holding time, you are requested to clear and try again at a later time, say, "right" and clear. Make the subsequent attempt when due, using the original precedence time when invoking MX precedence.

WH Party Reports

AS A MEANS OF speeding the handling of "wh" reports, particularly in large offices, many companies have adopted a "wh" practice which provides that the calling telephone number and calling party's name will be included in the leave-word request.

When a customer indicates he is ready to talk on an Inward call, enter the name of the distant place in the "To PL" space on an OUT ticket, the "opr. (No.)" in the "To No." space and the "wh" in the "Spec. Inst." space. The customer's name and number are entered in the "From" spaces in the usual way.

If the customer volunteers calling details, enter in the space for reports, "cld. by (clg. no. including ext. or rm. no. if given) (Clg. name if given)."

After receiving the report ask the customer to hold the line and proceed with the call. Reach the calling place operator, pass "wh" report, including any calling details which have been volunteered by the called party. However, if the customer is not holding the line, say to the calling operator, "wh ringing" instead of "wh on line" and ring the called telephone as you pass the report. Enter "psd (time)" in the space for reports. When a disconnect signal is received, scratch and file the ticket.

In most all toll centers lists of frequently called numbers appear at the Inward Operator's positions and she is able to furnish a high percent of numbers without referring calls to Information. By passing your request to the operator who answers, you save operator and circuit time and give speedier service to your customer.

In general you will need to reach an Information operator only on calls to: (1) Residence telephones in cities; (2) when in doubt as to whether the tel. is business or residence; and (3) if street address only is given.

In some instances Inward operators will refer you to Information on calls to large and well-known business firms whose numbers you would expect her to know or have available. The reason for this generally is that some large firms are served by more than one PBX system or have separate listings for various offices or plant locations. The questioning necessary to determine which number you will require is best done by an Information Operator.

As an exception some tributary offices may find that they must reach Information on all address name calls at their toll center. In some toll center offices, signals from tributary exchanges are answered by C.L.R. operators instead of Inward, and such operators do not have frequently called number lists at their positions.

Memo From The Author

THERE IS AN OLD saying which advises that the best way to make an acquaintance into a friend is to ask a favor of him. Have you had such an experience and known the warm glow of satisfaction that came from doing a kindness for another? It seems to be true that most everyone likes to share knowledge and give to others the benefit of their experience. Knowing that this is so, I urge all of you who operate in tributary offices to seek the counsel and advice of your toll center traffic management people in problems which concern you both. I believe you will find them as interested in having you well informed as you are eager to learn. And by way of practicing what we preach, if there are particular items which you would like covered by articles like this, won't you let us hear from you?—THE END.

"All play and no work" was the theme of a recent dinner and theater party for members of the Jacksonville branch of the R.B. Still Pioneer Club, Illinois Telephone Co. The above photo was taken during dinner at the Jacksonville Country Club. Seated (l. to r.) — EDGAR BROWN, Jacksonville plant; IRENE GOODALL, Jacksonville chief operator; WELDON HIGHFILL, Jacksonville plant; AILEEN SWITZER, Jacksonville toll supervisor; B. C. SCHWEITZER, general commercial manager, Bloomington (Pres. of the R. B. Still Pioneer Club); VIRGINIA LONERGAN, Jacksonville local supervisor (vice pres. of the R. B. Still Pioneer Club); CHARLES TONN, Jacksonville plant; MARGARET RILEY, Jacksonville plant clerk; JOE MANN, Jacksonville plant; RUTH WALLACE, Winchester operator. Standing (l. to r.) — MARGARET O'BRIEN, retired, Jacksonville operator; W. O. RANDALL, Jacksonville district mgr.; ETHEL CULBERTSON,, White Hall chief operator; FLORENCE WHITWORTH, Roodhouse chief operator; MARGARET CLANCY, Jacksonville cashier; AGNES TEFFEY, Jacksonville cashier; MINNIE MCDADE, Winchester operator; ED BASHAM, Jacksonville plant; LEAH COWPER, Winchester chief operator; CARLOS MORROS, White Hall plant; CLARENCE TUCKER, retired, Jacksonville plant; MARTHA STURMON, Carrollton chief operator.

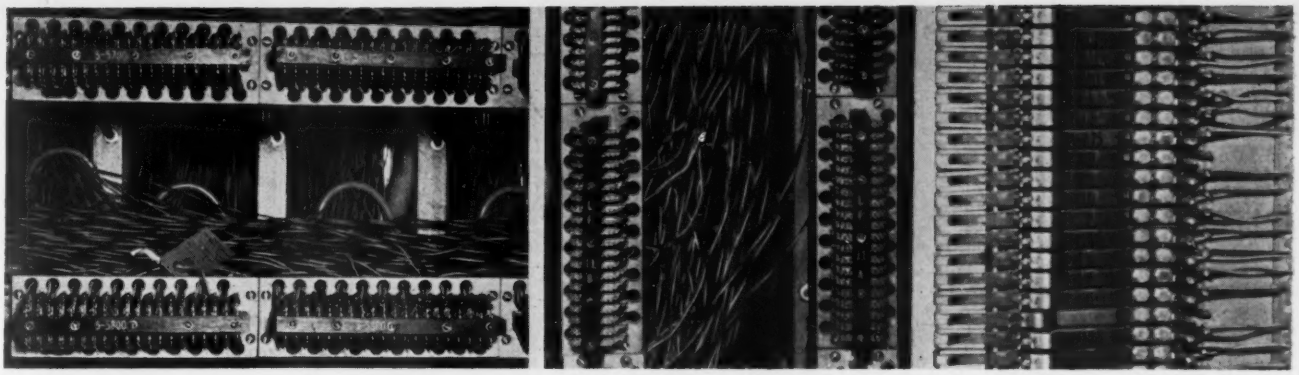

FIGURE THIRTEEN — Distributing frame terminal markings enable proper jumper connections and facilitate recording of the connectors in the cable record. Left — Horizontal side of L.I.D.F. showing telephone number markings (office side). Center — Vertical side of L.I.D.F. showing line equipment numbers. Right — Protector side of M.D.F. showing line equipment numbers. Other side of M.D.F. is cable side and horizontal terminal strips are marked with rack numbers.

CABLE PLANT CONSTRUCTION

By JOHN S. REED

In Part II-A Mr. Reed discusses — (1) Value of Cable Records, (2) Numbering Schemes Used in Cable Records, Maps and Associated Forms, and (3) Numbering Schemes for Cable Terminals.

Value of Cable Records

CABLE PAIRS are subject to frequent reassignments because of subscriber additions, moves, or disconnects. Newcomers in the community contract for telephone service and subscribers moving from one part of the town to another often request a regrade of service such as from party-line to individual line classification, or discontinue service altogether. Cable records are needed to keep track of the resulting changes in cable pair assignments.

A well-organized system of cable records and maps is essential to the smooth functioning of the various plant operations. When a customer, for example, desires service, the commercial department must determine whether a cable pair or a party line station connection is actually available so that the subscriber can be assured of an immediate connection, or be informed that his order has to be held for a time. The cable department will have to determine from the records how the various connections between the central office and the new subscriber will have to be "lined up," so the subscriber can have telephone service. The frameman will need to know the correct main frame, line intermediate frame, and switchboard numbers for connecting the central office switching equipment to the outside cable pair. The installer cannot make the installation without knowing the location of the correct cable terminal and the proper pair number in the terminal.

For cable relief studies, the cable records and maps are absolutely essential in determining the present cable fill and the points of cable congestion. Cable splicers and trouble men also depend upon the same records and maps for aid in locating cable trouble, particularly when wet pairs are involved. Testboardmen also make use of information from cable records for testing lines.

Small exchanges should maintain at least a simple cable record and a plat showing the cable layout in the town. Even when the main cable consists of as few as 50 pairs, confusion and loss of time will result if a record of the pairs is not set up and kept up to date. The cable record and map are supplementary to the subscribers card record and all are indispensable.

Numbering Schemes Used in Cable Records, Maps and Associated Forms

CABLE RECORDS and maps make use of several numbering schemes for identifying cable pairs and their terminations and for locating cable terminal poles.

The numbering systems for cable pairs, main frame or rack terminations, and terminations in outside cable terminals have been partly explained in a previous installment. The outside cable pairs entering the central office terminate on one side of the main frame, called the cable side. At this point, each pair termination is assigned a main frame or rack number, starting with "1" and continuing in consecutive order until all pairs have been assigned numbers.

The inside cable pairs from the office equipment terminate on the other side of the frame, termed the office or switchboard side. Each office pair termination is designated by

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TELEPHONE NUMBER GROUP

CONNECTOR TERMINAL RECORD GROUP 5-87

TERM NO	LINE EQUIP	OTHER PARTY ON LINE	CLASS OF SERVICE R-1	R-2	ROT	B-1	B-2	TERM NO	LINE EQUIP	OTHER PARTY ON LINE	CLASS OF SERVICE R-1	R-2	ROT	B-1	B-2
50	7-B-197							00	7-B-85						
49								09	7-B-01						
48								08	7-B-99						
47	7-B-189							07							
46	4-D-54							06	7-B-95						
45	7-B-184							05	7-B-93						
44								04	7-B-92						
43								03							
42	7-B-181							02	7-B-89						
41	7-B-179							01	4-B-182						
40	7-B-161							90	7-C-51						
39	7-B-175							99	TEST						
38	7-B-173							98	7-C-65						
37	7-B-172							97	7-C-63						
36								96	7-C-62						
35	7-B-169							95	7-C-61						
34	7-B-167							94	7-C-57						
33	7-B-165							93	7-C-55						
32	7-B-163							92	7-C-53						
31	7-B-162							91	7-C-52						
30	7-B-141							80							
29	7-B-155							89	7-C-49						
28	7-B-153							88	7-C-47						
27								87	7-C-45						
26	7-B-51							86	7-C-43						
25								85							
24	7-B-161							84							
23	7-B-156							83	7-C-39						
22	7-B-143							82	7-						
21	7-B-142							81	7-C-35						
20	7-B-129							70	7-C-13						
19	7-D-49							79	7-C-32						
18	7-B-137							78	7-C-31						
17	1-A-135							77	7-C-27						
16	1-A-42							76	7-C-25						
15	7-B-132							75	7-C-72						
14								74	2-B-77						
13	7-A-129							73	7-C-21						
12	1-D-145							72	7-C-19						
11	7-A-125							71	7-C-17						
10	7-B-02							60							
19								69	7-C-13						
18	7-B-121							68	7-C-12						
17								67	7-B-107						
16	7-B-117							66	7-A-105						
15	7-B-115							65	7-B-103						
14	7-B-113							64	7-B-102						
13	7-B-112							63	7-B-101						
12	7-B-AB							62	7-B-197						
11								61	7-C-91						
TOTALS								TOTALS							

FIGURE FOURTEEN — The connector terminal record is used for listing line equipment numbers associated with connector terminal (telephone number group).

LINE FINDER GROUP

LINE EQUIPMENT RECORD GROUP 7-C 00-99

LEQ NO	CONN. TERM. NEG.	CONN. TERM. POS.	CLASS OF SERVICE R-1	R-2	ROT	B-1	B-2	R-O	Rack No.	LEQ NO	CONN. TERM. NEG.	CONN. TERM. POS.	CLASS OF SERVICE R-1	R-2	ROT	B+	B-2	R-O	Rack No.
50										00									
49										09									
48										08									
47	5-8794	5-8694	✓						14389	07	5-9036	5-4093	✓						9446 7
46										06	5-2258								12554
45	5-8793	5-8693	✓						12553	05	5-1923	5-8823	✓						8941
44										04	5-8822		✓						17334
43	5-8792	5-8692	✓						6479	03	5-8722		✓						17340
42	5-8791	5-8691	✓						13699	02	5-2344	5-8821	✓						12421
41	5-8790	5-8690							6943	01	5-8720	5-8820	✓						4723
40										90									
39	5-8789	5-8212	✓						6738	99	5-8719	5-8819	✓						5360
38										98									
37	5-8788	5-4265	✓						14134	97	5-8718	5-8818	✓						8187
36										96									
35	5-8787	5-8687	✓						6571	95		5-8817	✓						5743
34										94									
33	5-8786	5-8686	✓						5936	93	5-8716	5-8816	✓						12341
32	5-2515	5-8685	✓						18670	92		5-8815	✓						6990
31	5-5064	5-8684	✓						18859	91	5-8761	5-8814	✓						21361
30										80									
39	5-8783	5-8683	✓						13512	89	5-8713	5-8813	✓						13919
38										88									
37	5-7445	5-2617	✓						6288	87	5-8712	5-8812	✓						19893
36	7-3136		✓						20650	86	7-1948								20512
35	5-8781	5-8681	✓						14677	85	5-8911	5-8811	✓						14112
34		7-340	✓						23649	84	7-1930	7-1936	✓						20511
33	5-6417	5-8680	✓						5420	83	5-8910	5-8810							6975
32	5-8779	5-8679	✓						14246	82	5-8909	5-8809	✓						4961
31	5-8778	5-8678	✓						14259	81	5-8908		✓						12419
20	5-1976								14859	70	7-2037	5-2685	✓						12592
29	TEST									79	5-8907	5-8807	✓						18865
28		5-2614	✓						23684	78	5-2130								7166
27	5-8777	5-6556	✓						18762	77	5-6925	5-8806	✓						16229
26										76	5-2327	5-7295	✓						20210
25	5-8776	58676	✓						17908	75	5-1905	5-8805	✓						14595
24										74									
23										73	5-8904	5-8804	✓						14682
22		5-8674	✓						10649	72	5-7122	5-8803	✓						17911
21	5-1773	5-8673	✓						6714	71	5-8902	5-8802	✓						15217
10	TOLLOGT	9023								60									
19	5-8772	5-6588	✓						9232	69	5-8901	5-2404	✓						18258
18										68									
17	5-8771	5-8671	✓						15419	67	5-8900	5-8800	✓						17273
16										66									
15	5-8770	5-8670	✓						4759	65	5-8798	5-8698	✓						8580
14										64									
13	5-8769	5-8669	✓						13759	63	5-8797	5-8697	✓						7764
12	5-8768	5-8668	✓						10956	62	5-8796	5-8696	✓						10329
11	5-174								11196	61	5-8795	5-8695	✓						17809
TOTALS										TOTALS									

FIGURE FIFTEEN — The line equipment record lists positive and negative telephone numbers associated with line equipment numbers. It may also be used to list rack numbers.

the switchboard or telephone number. Jumpers connect the telephone numbers to any outside cable pairs as required to connect the proper subscribers.

The rack numbers appear on the cable record in the same consecutive order as on the main frame. The telephone numbers are assigned by the commercial department and are entered on the cable record together with the proper rack and terminal numbers.

In dial exchanges operating on terminal-per-station basis, as distinguished from terminal-per-line, a line intermediate distributing frame is provided in addition to the main distributing frames. On this line I.D.F. jumpers connect the line equipment terminals to the connector terminals, requiring a numbering scheme so that the proper terminals can be identified for cable assignments. *Figure* 13 illustrates the method of identifying the terminals.

In *Figures* 14 *and* 15 are shown sample record forms for listing connector terminals and line equipment terminals. The connector terminals are designated by telephone numbers, while the line equipment terminals employ a letter and numeral code combination such as 7-C-145, for example. The first figure is the number of the line finder bay. The letter following denotes the shelf order of the line finder banks, generally A, B, C, and D, while the last figure is the line equipment terminal number (1 to 200).

Connector terminal numbers for two-party lines are indicated as positive or negative according to the side of the line the subscriber is connected to. The negative side of the line corresponds to the battery or ring side, while the positive side corresponds to the ground or tip side.

Numbering Scheme for Cable Terminals

FOR VERY small towns a simple arbitrary system of numbering, such as serial numbers #1, #2, #3, etc., probably would be sufficient for locating cable terminals along the cable leads and their laterals. A more flexible numbering scheme is needed for larger towns such as the one illustrated in *Figure* 16.

In this system, the cable terminals are designated by a letter and numeral code which locates the terminal with respect to a given point (not always the central office), and indicates its position within the city block. As shown in *Figure* 17, each terminal pole bears the code in the form of metal figures and letters. This method results in a more permanent marking than paint stencils.

As indicated in *Figure* 16, the dividing or base lines for the numbering scheme are on two streets that intersect at the given point. Terminals south of the east-west base line are designated by numbers beginning with zero and increasing by ten for each block going south. The terminals north of the division street start with some multiple of 100 (such as 400 in *Figure* 16), which should be at least 100 above any number in the

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Available for construction, maintenance, and service work in all phases of the public utility industry, POWERS-American Bodies are "job-engineered" to step up crew efficiency and lower operation costs. Their quality construction guarantees long life and trouble-free service.

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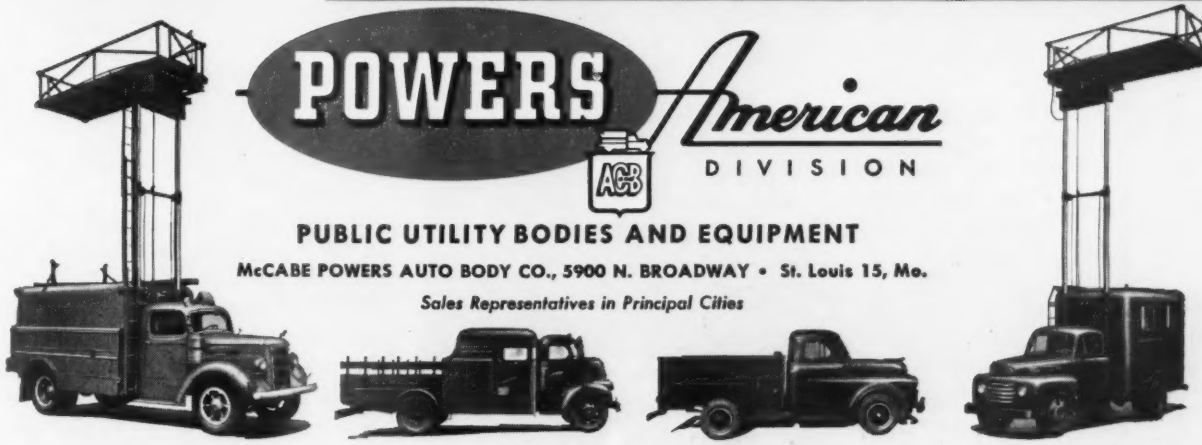


south half. These numbers increase by ten for each block going north.

This arrangement provides for ten terminals in each block, though additional terminals may be designated by suffixing "½" to the terminal number. The last digit of the number gives the position of the terminal within the city block, and the remaining digits indicate the number of blocks north or south of the base line.

The terminals east and west of the north-south base line are designated by letters. The first letter in the code denotes whether the terminal is east or west of the office, and the letter combination then shows the number of blocks in that direction. For terminals west of the office, the first letter is taken from the first half of the alphabet and for terminals east of the office, the letter is taken from the last half.

To illustrate the use of this numbering scheme, the number 407 AA indicates that the terminal so designated is the last pole in the alley, one-half block north of the office and in the first block west of the office. By the same reasoning, terminal 55 NE would be on the second pole in the alley in the fifth block east and the sixth block south of the office.

Another numbering plan that is commonly employed in large cities makes use of the street address of the property directly adjacent to the terminal pole for the cable terminal number. When the cable lead passes through an alley, the adjacent house number indicating the location of the terminal is prefixed "R" for "rear." If the lead passes along a street, the corresponding house number is prefixed "F" for front. In the case of a cable lead along a line dividing a series of properties (vacated alley) the street number is consistently taken from one side only of the line as north or east side, according to the direction of the lead.

Assume, for example, that a cable lateral passes along an alley between Pine and Ash streets. The lead is on the side of the alley nearest Pine street and extends from 24th street to 30th street. The first terminal pole is adjacent to the property having house number 2405. This terminal is shown on the record as being located at R-2405 Pine. The next terminal is adjacent to house number 2421 Pine and is assigned R-2421 Pine. The last terminal in the lateral is found to be at 3027 Pine and is so designated. If the lead had been located in the other side of the alley, the corresponding designations could have been R-2406 Ash, R-2422 Ash and R-3028 Ash respectively. Had the cable lead been placed along the even-numbered side of Ash Street instead of along the alley, the locations of the terminals could have been specified as F-2406 Ash, F-2422 Ash, and F-3028 Ash.

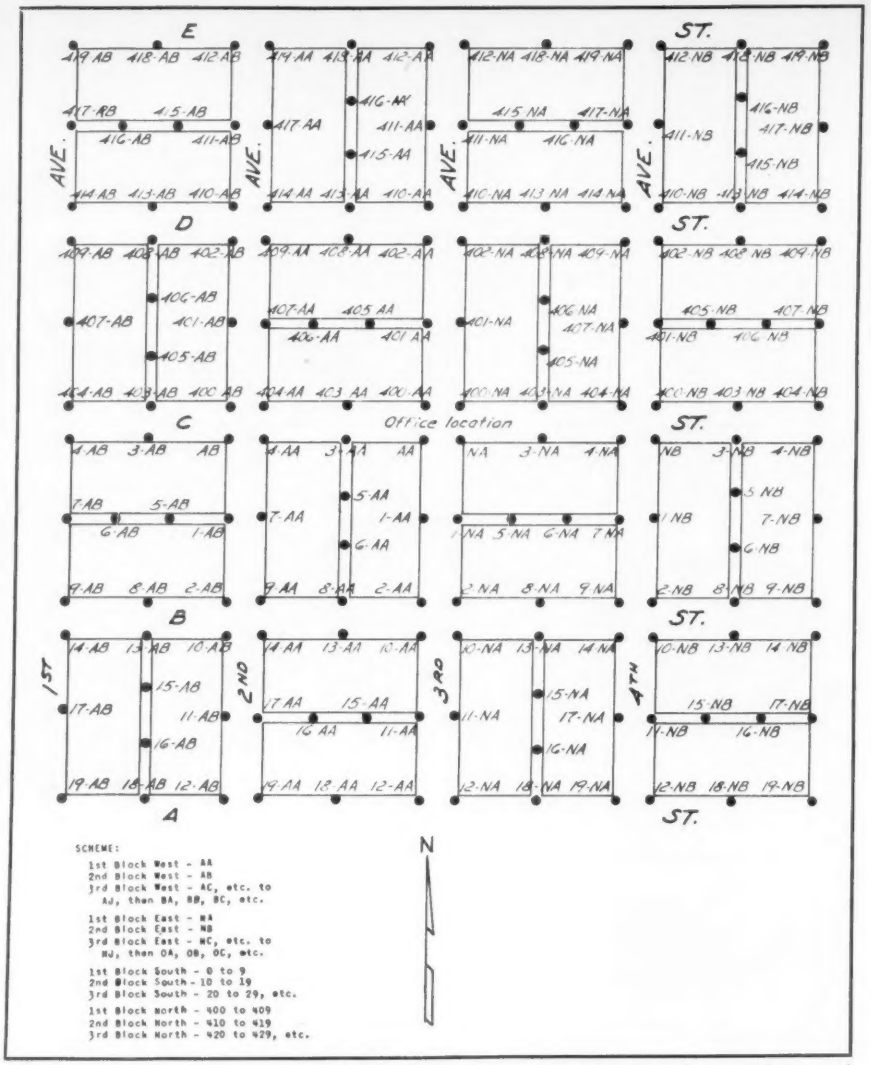
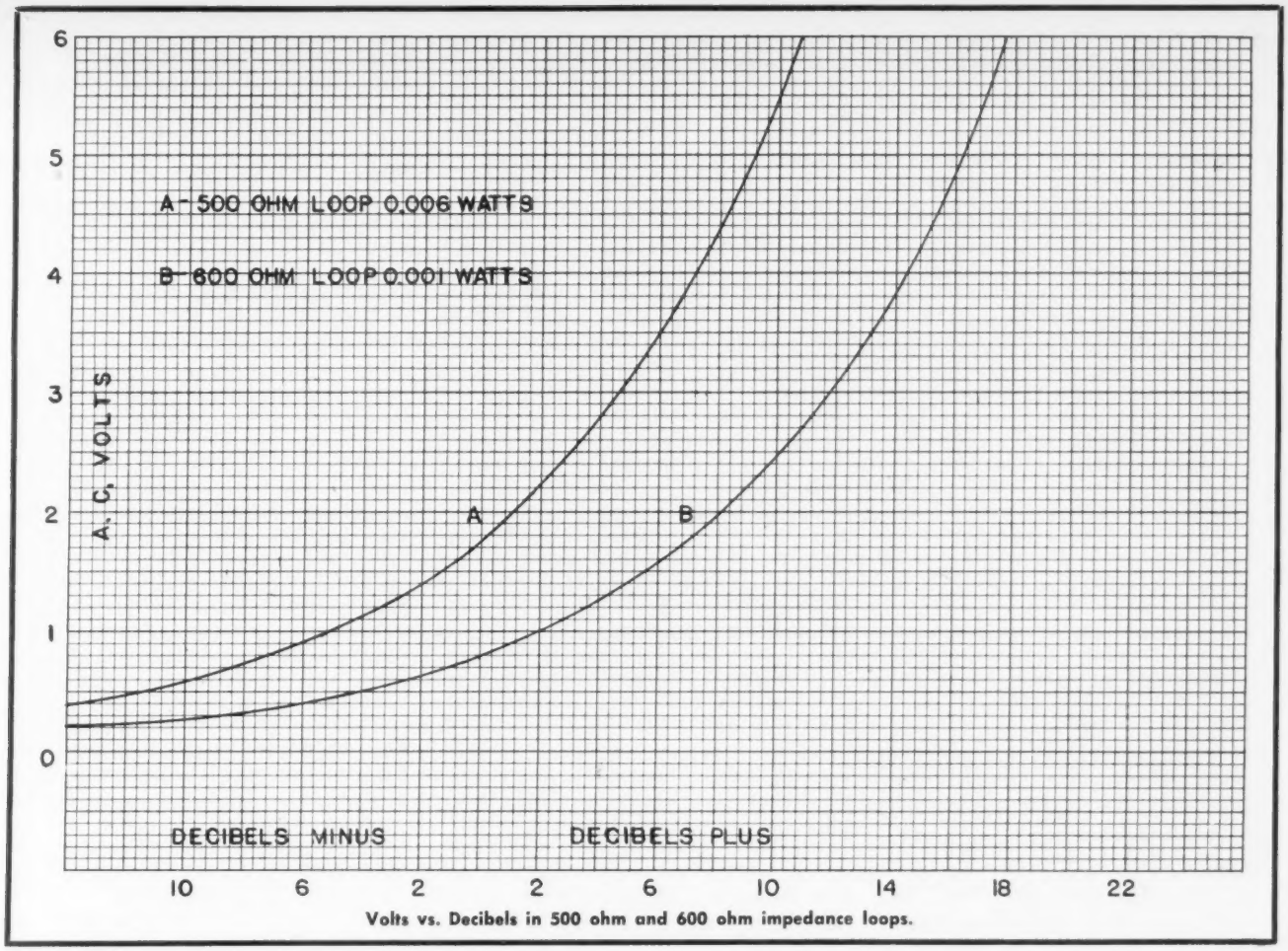

E
D
C
B
A
ST.
AVE.
1ST
2ND
3RD
4TH
Office location
N
SCHEME:
1st Block West - AA
2nd Block West - AB
3rd Block West - AC, etc. to AJ, then BA, BB, BC, etc.
1st Block East - NA
2nd Block East - NB
3rd Block East - NC, etc. to NJ, then OA, OB, OC, etc.
1st Block South - 0 to 9
2nd Block South - 10 to 19
3rd Block South - 20 to 29, etc.
1st Block North - 400 to 409
2nd Block North - 410 to 419
3rd Block North - 420 to 429, etc.

FIGURE SIXTEEN — The terminal numbering scheme locates terminals by a letter and numeral code combination.

FIGURE SEVENTEEN — Aluminum letters and figures for terminal numbers provide a more permanent marking than stenciled designations. Note old stencil markings that have become illegible.

In some cases, both the number and letter code and the house number code may be shown in the cable record for identifying terminals and indicating their locations. The two codes for each terminal are jointly entered on the cable record at the head of the vertical row of terminal pairs thus: 115 OE R-3027 Pine.

Part II-B of Mr. Reed's training course will appear in the January, 1954, issue of TELEPHONE ENGINEER & MANAGEMENT. These important subjects are scheduled for discussion: (1) the Cable Record Book; (2) Cable Record Entries on Assignment Side; and (3) Terminal Feed Record.



Volts vs. Decibels in 500 ohm and 600 ohm impedance loops.

QUESTIONS and ANSWERS

Conducted by JAY G. MITCHELL

In this issue Mr. Mitchell (a) Continues the discussion of the Decibel Calibration of the Multitester, (b) Answers an inquiry for specifications for a "Drop Testing" buzzer, and (c) Discusses individual line calling on a rural multiparty telephone line.

QUESTION: — *In one of the early questions on the Decibel Calibration of the Multitester there was a comment to the effect that the writer had been unable to convert the observed readings obtained with a multitester into the equivalent readings for the same circuit conditions on the conventional basis of the* 600 *ohm loop and the* 0.001 *watt Zero Reference Level. Can you explain how such a conversion should be made. We find that our meter, which is calibrated for the* 500 *ohm loop and the* 0.006 *watt Zero Reference Level, has been of unexpected value in the maintenance of some portions of our system but, for our better satisfaction, we would like to be able to convert the readings that we now get into what would be the equivalent readings on the more conventional telephone basis.*

ANSWER: — This is a very promising line of thought for the ordinary maintenance of telephone plant. It is a request for an explanation of the conversion of Dbs. into Dbms. as it is fairly well established that when the Zero Reference Level is 0.001 watts in a loop of 600 ohms that the term Dbm as a conventionial is employed to indicate that that is the basis for the readings obtained. For any given condition the conversion can be computed by an application of Ohm's Law but a simpler method is available and the results obtained are sufficiently accurate for most purposes

Volts In Loop Of 500 Ohms Impedance vs. Decibels

VOLTS	AMPERES	WATTS	——RATIOS—— POWER	VOLTS	SIGN	Db.
0.500	0.0010	0.000500	0.0833	0.29	minus	10.80
0.750	0.0015	0.001125	0.1875	0.43	minus	7.30
1.000	0.0020	0.002000	0.3333	0.58	minus	4.80
1.250	0.0025	0.003125	0.5208	0.72	minus	2.80
1.500	0.0030	0.004500	0.7500	0.87	minus	1.25
1.730	0.0035	0.006000	1.0000	1.00		0.00
1.750	0.0035	0.006125	1.0208	1.01	plus	0.10
2.000	0.0040	0.008000	1.3333	1.16	plus	1.20
2.250	0.0045	0.010125	1.6875	1.30	plus	2.30
2.500	0.0050	0.012500	2.0833	1.45	plus	3.20
2.750	0.0055	0.015125	2.5208	1.60	plus	4.00
3.000	0.0060	0.018000	3.0000	1.73	plus	4.80
3.250	0.0065	0.021125	3.5208	1.88	plus	5.50
3.500	0.0070	0.024500	4.0833	2.02	plus	6.10
3.750	0.0075	0.028125	4.6876	2.17	plus	6.70
4.000	0.0080	0.032000	5.3333	2.31	plus	7.30
4.250	0.0085	0.036125	6.0201	2.46	plus	7.80
4.500	0.0090	0.040500	6.7500	2.60	plus	8.30
4.750	0.0095	0.045125	7.5208	2.75	plus	8.80
5.000	0.0100	0.050000	8.3333	2.89	plus	9.20

for which the multitester type of instrument is suitable.

In the graphs shown in the last installment of this series, which are repeated again on page 67, it will be noted that the relation between the decibels and the A.C. volts is graphically shown for two loops and two Zero Reference Levels. Assume, for an illustration, that an instrument calibrated for a 500 ohm loop and a Zero Reference Level of 0.006 watts, curve "A", indicates for a circuit condition an output of plus 6 decibels. Tracing the plus 6 decibel vertical line to its intersection with curve "A" it will be seen that the volts indicated is just under 3.5. Then tracing the A.C. volts to the right until the curve "B" is intersected it will be seen, by tracing the vertical line down from the point of intersection, that the number of decibels indicated by the curve "B" is 13.1. In other words the circuit conditions which resulted in a decibel reading of plus 6 in a multitester calibrated for a 500 ohm loop and a Zero Reference Level of 0.006 watt would, in an instrument calibrated for a 600 ohm loop and a Zero Reference Level of 0.001 watts indicate 13.1 Dbm.

In another illustration it will be found that an indication of plus 10 Db. by the multitester calibrated for a 500 ohm loop and a Zero Reference Level of 0.006 watts is representative of circuit conditions which, in the case of an instrument calibrated for a 600 ohm loop and a Zero Reference Level of 0.001 watts, would be 17.03 Dbm. The data contained in the tables published in the issue of FORTNIGHTLY TELEPHONE ENGINEER for October can be recorded in two graphs similar to those shown, on a larger scale, if it is desired to read the quantities more closely than is possible in the cut. It is obvious that the use of two graphs of this type will afford conversion possibilities sufficiently accurate for most purposes. It is also certain that the method suggested is much less difficult and tedious than the necessary computations, under Ohm's Law, would be.

QUESTION: — *I would like to construct a small buzzer which could be used to trace out working drops in a dial exchange with the use of a regular dial test receiver. Could you furnish me with a simple sketch of one, listing the parts necessary? I would deeply appreciate this information.*

ANSWER: — This inquiry is so broad in its character that it is impossible to outline any reasonable reply without more complete information. It is suggested that it be amplified by the originator with an outline of exactly what is desired to accomplish and what facilities are now available in the equipment belonging to the telephone company. It is believed that the manufacturer of the dial equipment in use in the plant could suggest some solution. It is also suggested that the manufacturers of testing equipment and instruments be asked for suggestions. If desired QUESTIONS AND ANSWERS will be very glad to have a more complete outline of what is desired and may possibly, when more complete information is available, be able to offer some suggestions that will be helpful. One important factor would be a statement of the type of dial equipment in use and a brief description of the testing equipment now available in the central office.

QUESTION: — *Would it be possible to get, for a reasonable price, a telephone ring selector suitable for use on a dial telephone line that has divided ringing — code ringing with 20 cycle current. Our school house*

Volts In Loop Of 600 Ohms Impedance vs. Decibels

VOLTS	AMPERES	WATTS	——RATIOS—— POWER	VOLTS	SIGN	Db.
0.0500	0.00008	0.000004	0.004	0.065	minus	23.9
0.1000	0.00017	0.000017	0.017	0.129	minus	17.7
0.1509	0.00025	0.000038	0.038	0.193	minus	14.2
0.2000	0.00033	0.000066	0.066	0.258	minus	11.8
0.2500	0.00042	0.000105	0.105	0.323	minus	9.8
0.5000	0.00083	0.000415	0.415	0.644	minus	3.8
0.7500	0.00125	0.000938	0.938	0.968	minus	.3
0.7746	0.00129	0.001000	1.000	1.000		0.0
1.0000	0.00166	0.001666	1.666	1.291	plus	2.2
1.2500	0.00208	0.002604	2.604	1.614	plus	4.2
1.5000	0.00250	0.003750	3.750	1.936	plus	5.7
1.7500	0.00292	0.005104	5.104	2.259	plus	7.1
2.0000	0.00333	0.006666	6.666	2.582	plus	8.2
2.2500	0.00375	0.008438	8.438	2.905	plus	9.3
2.5000	0.00417	0.010416	10.416	3.227	plus	10.2
2.7500	0.00458	0.012595	12.595	3.550	plus	11.0
3.0000	0.00500	0.015000	15.000	3.872	plus	11.8
3.2500	0.00542	0.017602	17.602	4.196	plus	12.5
3.5000	0.00583	0.020416	20.416	4.518	plus	13.1
3.7500	0.00625	0.023438	23.438	4.841	plus	13.7
4.0000	0.00666	0.026640	26.640	5.164	plus	14.3

has a dial telephone on a farmer line and we would like to have it so the bell would not ring except when the school is being called. There is electric service at the school house and we believe that it should be possible to build a satisfactory ring selector. Can you help us?

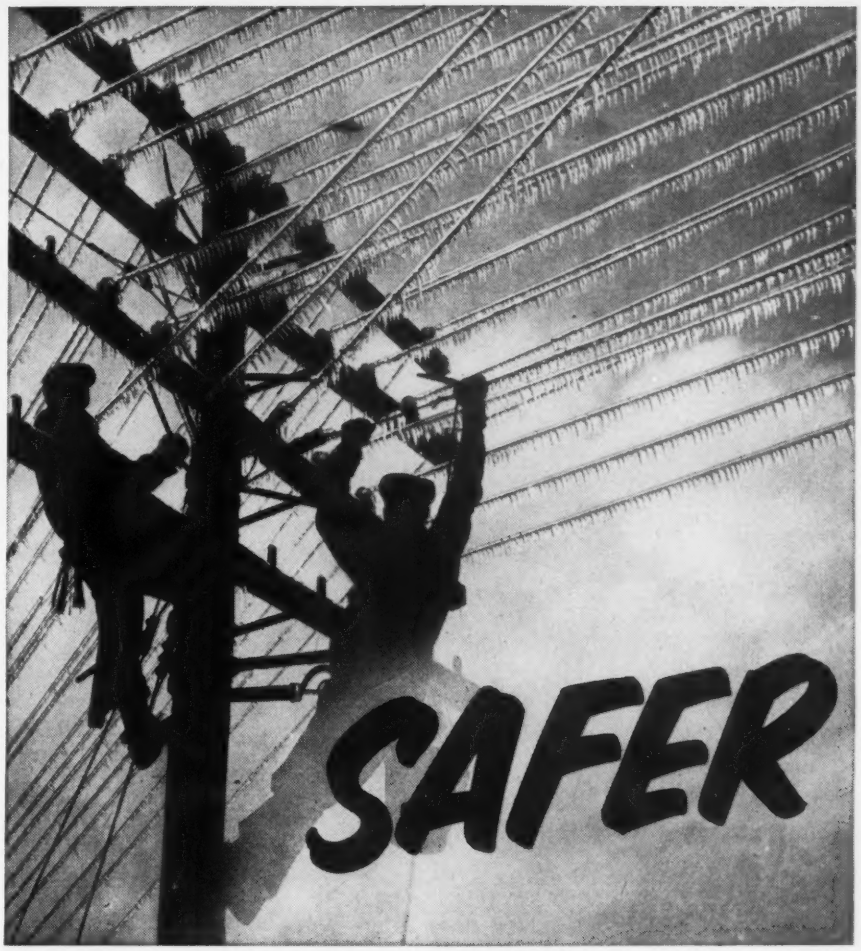
ANSWER: — Without any data as to the type of dial equipment that is in service at this school house it is impossible to set out any design for the attainment of the desired result. In the first place it is not stated what would be considered a *reasonable* price. In effect this inquiry is an expression of a desire for individual line telephone service, as far as being called is concerned, while paying, probably, the rate for rural multiparty service. The desired arrangement is probably not at all theoretically difficult but the exact cost would be determinable, by the telephone company, and might easily exceed the additional cost of an individual telephone line to this school house which is suggested. It is recommended because the *additional cost* of individual service, as provided by the telephone company, would, no doubt, be less than the rental that would be chargeable for special ringing equipment required.

History of Regulation Reviewed by Commission

THE NEW YORK Public Service Commission has published a historical review of the development of utility regulatory bodies in New York State covering the period from 1855 to 1953. The 47-page booklet summarizes briefly the attempts of State agencies to regulate railroads and gas companies in the second half of the nineteenth century and deals primarily with the origin of modern regulation which had its inception under Gov. Charles Hughes in 1907 and the changes which occurred since then.

Governor Hughes, according to the review, built a comprehensive regulatory system despite "strenuous opposition from powerful groups in and out of the utility field." Governors Roosevelt, Lehman and Dewey are credited with being "strong proponents of effective regulation" of public utilities.

"Under their leadership," the booklet states, "utility regulation in New York State has been a dynamic process that has kept pace with developments."



A veteran lineman was asked: "What precautions do you take before climbing a pole to make sure that it is safe?" His reply: "First we make sure it's a Koppers Pole, then we don't worry."

on dependable Koppers Poles

• It's a nasty job, at best, to work on lines that are crusted with ice. And linemen don't want the additional danger of working on spongy poles that have been weakened by shell rot.

When the poles are Koppers, linemen are safer. They *feel* safer, too, because they know their gaffs will get a good, solid bite on sound wood.

Koppers Poles, for their full length, are pressure-creosoted against decay, weathering and termite attack. They *stay* sound and strong through the years.

Many strategically located Koppers treating plants assure prompt, dependable service.

For dependable poles, backed by a dependable company, specify Koppers. Write to us for prices or further information.

KOPPERS COMPANY, INC.
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KOPPERS PRESSURE-CREOSOTED WOOD

a salute to telephone people everywhere

Every man and woman in the telephone business shared in a special sense of accomplishment as America's 50 millionth telephone went into service last month.

It has taken the thought and skills and devoted service of *all* telephone people to create this monumental communications arm for America.

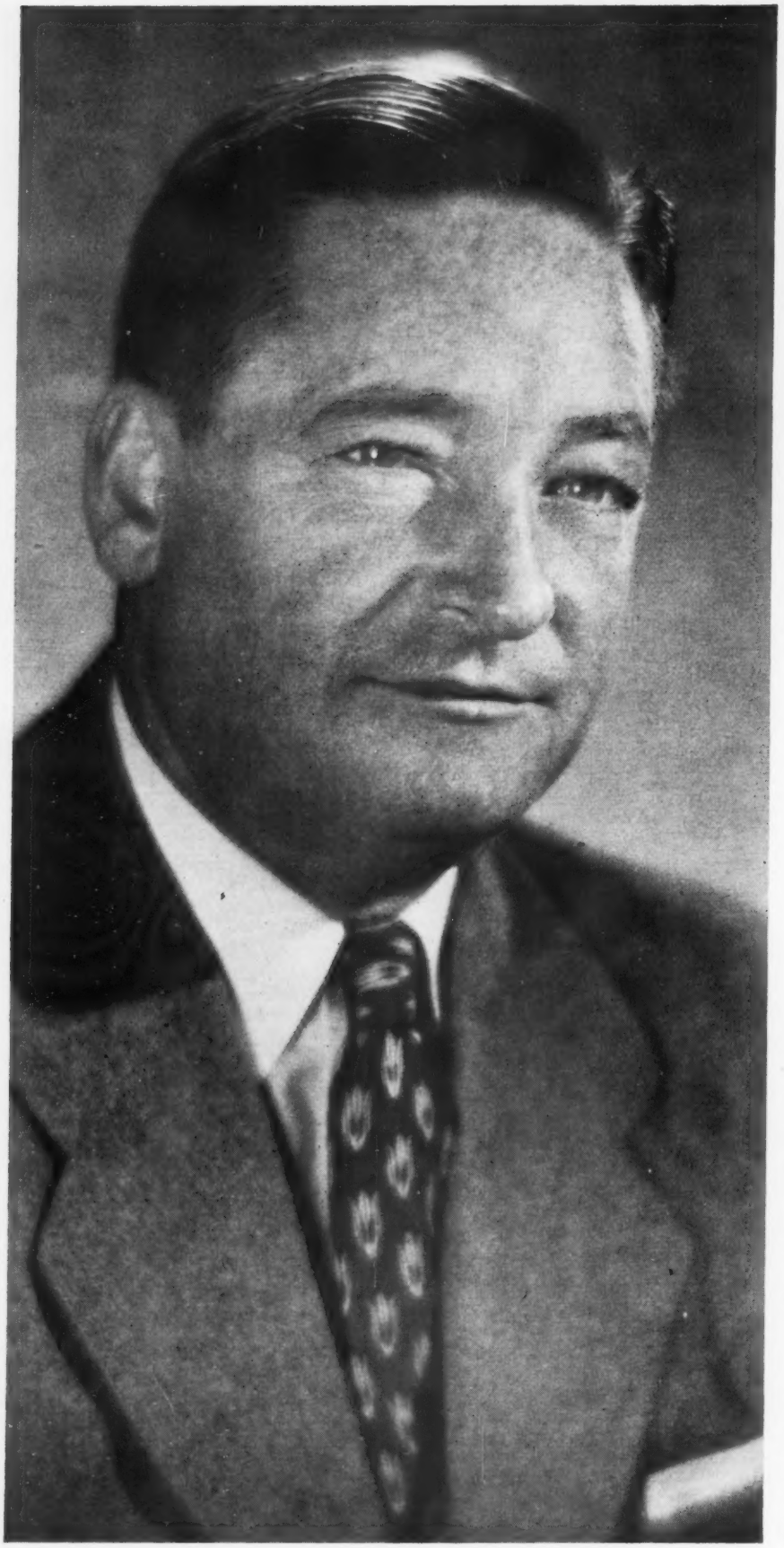
The keynote has been co-operation—among telephone people themselves, and between our nation's 5300 independent telephone companies and the Bell System.

The public—the telephone customers—are the greatest gainers by this triumph of private enterprise. People are bound more closely together. Their day's tasks are made easier . . . their friendships closer. And the nation is stronger in peace and war.

For the future, all of us in telephony make this pledge—Americans will benefit still more in the years to come as the telephone grows even greater in numbers . . . strides even further ahead in usefulness and value.

BELL TELEPHONE SYSTEM

Commemorating
THE 50 MILLIONTH
TELEPHONE



MEET CHARLIE CASHEL, the friendly, 44-year old manager of the Worthington Telephone Exchange Co. at Worthington, Minn. Chance is that you've met him at several of the national telephone conventions and conferences, because he's been a pretty regular attender. Charlie is a past president of the Minnesota Telephone Association, and has been a director of that group for 20 years. (That puts him back to about one year after he first entered the telephone business.)

Worthington's Good Neighbors

In Worthington, Minn., the Cashel family practices the essentials of effective telephony and good public relations right around the clock, 365 days a year.

By JOHN WITHY

IN THE MINNESOTA farming community of Worthington, which advertises itself as the world's turkey capitol, they describe the Cashel family as the community's "good neighbors."

And certainly there's no better description for Charles and Tedo Cashel of the Worthington Telephone Exchange Company — whether referring to them as telephone people or as active members of the community.

The description probably got most of its prominence back in 1947, when Charlie and Tedo were the originators of Worthington's own "good neighbor" program which saw the small Minnesota city "adopting" the West German city of Crailsheim, and sending over tons of food, clothing and other hard-to-get items, in a gesture that gave real meaning to the term democracy.

But the "good neighbor" title also has real meaning in the modern brick

THIS IS THE MODERN concrete and brick building housing office and plant of the Worthington Telephone Exchange Company. The structure is completely air-conditioned and fireproofed, and the exterior was designed to match other homes and buildings in the part-business, part-residential neighborhood in which it is located.

building off Main street which is the headquarters office and plant of the Worthington Telephone Exchange Company.

Worthingtonians can thank those "good neighbors" there for a program of telephone expansion and improvement which has given their city a brand of telephone service unsurpassed in few other cities of similar 8,000 population.

For instance, how many cities of that size can report having had fully-automatic dial service since 1944; or that every rural line has 10 or less parties on it; or that every telephone in the system is a modern dial handset? And how many independent companies can report that every held order for service and regrades has been met, and that they have been a part of the nationwide operator toll-dialing program since 1951?

All these improvements, and many more, are already past history for the Worthington Telephone Exchange Company — the beneficial results of a carefully-planned long range program for keeping Worthington's telephone service fully abreast of developments in the field.

Getting back to that "good neighbor" title again: here's a concrete example of a stunt which not only built tremendous community goodwill towards the telephone company, but gave the company a lot of fun in the doing (with, perhaps, just one or two small headaches).

Charlie Cashel, as intimated before, always keeps his eye out for new equipment and techniques in the business. One development which caught his fancy a couple of years ago was an automatic recording device displayed at a telephone convention. So he purchased one of the units, seeing possibilities for using it in giving recorded messages on calls to "repair service," and in building up special telephone business for some of his friends on Main street.

But the real jackpot idea came about a year ago, when Charlie hit on the thought that the telephone company could and should do something special to make Christmas a happier and merrier one for the children of the community. How better to do it, he theorized, than to invite every Worthington kid to speak directly to Santa Claus by telephone — way up at the North Pole — not in a local department store. And there was another benefit: teaching the kids how to use the telephone themselves.

The automatic message device was, of course, the answer. Charlie prevailed on Stanley Nelson, Nobles county clerk of court and "Santa Claus" at many a community function, to be his voice at the "North Pole" number, and a recording was made. The caller first heard an operator say, "North Pole operator. North Pole operator. I'll connect you with Santa Claus." Then followed a jovial, chatty recording in which Santa, with booming voice, reports that "everything's all ready, up here at the North Pole, etc, etc," with an aside admonition to Blitzen (that pesky reindeer) "to get his nose out of that candy." The recording ended with the reminder that "all you kiddies better be good, because I'll be seeing you on Christmas eve." Then Santa bids them goodbye with a profusion of hearty "Merry Christmases."

Charlie only needed a couple of small ads in the *Worthington Daily Globe* to announce the service and give the number to call. Then began the reaction.

By seven o'clock the next morn-

HOW'S THIS for a pleasant place to work. This is the kitchen in the Worthington Company's employes' lounge, where the coffee's always hot and there's never an empty refrigerator or cupboard. From left to right are Cashier NELLIE RIEDESEL, Operator NORMA WILLEY and Billing Clerk DORIS THOMAS.

PLANT SUPERINTENDENT for the Worthington Telephone Exchange Company is L. A. OSTERFELD, a real veteran in the telephone business. Osterfeld is shown inspecting the company's circulator, which automatically dials numbers continuously at predetermined dial and pulse speeds to test central office equipment.

ing the calls had already started. By evening, over 800 calls had been completed, on only one trunk line. The next day the total was even higher. And by the end of 10 days, which brought things around to Christmas eve, there had been a total of 11,000 calls completed to the "North Pole" number. It was estimated that an additional 40,000 calls received busy signals. Long distance calls came in to the number from as far as 50 miles away.

"We couldn't walk very far up the street without being stopped and congratulated on the idea," Charlie reports. "There were very few kids in town who didn't talk to Santa Claus that year."

Disconnect System

GOODWILL of this sort pays off, the Worthington Telephone Exchange Company has found. When planning installation of dial equipment back in 1940, the company was faced with the choice of limiting length of calls, or providing more central office lines, at higher rates, in an attempt to regrade the heavy four-party usage in the exchange. Charlie cast his choice — admittedly with fingers crossed — in favor of limiting the length of calls. He installed a standard time disconnect system on all local lines, with the device set so that it automatically cut off all local calls at between six and eight minutes. A buzzer signal sounded a minute before cut-off time. Charlie ran some ads in the newspaper explaining what he was doing, and why. Then the new system went into operation.

"Naturally we were somewhat apprehensive about public reaction," Charlie reports, "and in the first few weeks we did receive some squawks. But soon people began to tell us that they liked the idea, since they got their business over the telephone conducted more quickly. It's only human nature to feel that it's always the other party who continues needlessly-long telephone conversations, and the buzzer creates the opportunity to finish the talk without a call-back. Visitors comment that Worthington folks "say their say" in less time over a telephone than anyone they've ever known. Many say they wish their own telephones were so equipped.

"And the funny thing is that now we receive complaints whenever the timer is temporarily disconnected for trouble shooting."

THE TELEPHONE BUSINESS is a family affair at Worthington. Here MRS. CASHEL — who held down an operator's job during the war when manpower was scarce — watches her daughter, MARTHA, 17, handle an incoming long distance call. Martha, who's away to college this fall as a freshman, worked on the board this summer performing vacation relief. She and her brother MICHAEL represent the fourth generation of the family in the telephone business at Worthington.

Company Founded In 1898

THE WORTHINGTON Telephone Exchange Company was founded in April, 1898, by C. J. Smallwood, Charlie's grandfather, and the original directory lists 43 telephones. Mr. Smallwood died of a heart attack while on the job in 1908. His widow, Florence M. Smallwood, and her oldest son, Dr. J. T. Smallwood, ran the company during the next several years. From 1915 to his death in 1932 the exchange was managed by C. M. "Moult" Smallwood, and was operated as a partnership of J. T. Smallwood, "Moult" Smallwood and Mary Cashel after their mother died in 1921. In 1927 it was incorporated.

Meanwhile Charlie Cashel, the son of Mary Cashel, was attending law school at the University of Minnesota, with an eye to following his father's legal profession. But when "Moult" died suddenly in 1932, the family called on Charlie to come back to Worthington and manage the company. It could be, perhaps, that the prospect of matrimony influenced his decision. At any rate, within a few months he was married to

Theodora Knaack, whom he had met at the university, and the couple was settled in Worthington. Mrs. Cashel, incidentally, prefers her nickname of "Tedo," and that's how she's known to scores of friends in the telephone industry.

The new, young manager of Worthington's telephone company wasn't on deck very long before he was giving a lot of thought as to how he'd like to see telephone service improved in his home town. Within a few years time the company's cable system was enlarged and put completely underground, as a preliminary to conversion of the exchange to dial.

Dial Conversion In 1944

BY 1942 THE company had moved into its new and present headquarters on a quiet avenue off the principal business street. Many hours of planning went into that building, and the result is a handsome, completely fireproof and air-conditioned structure which does a beautiful job of fitting into the neighborhood and at the same time provides an ideal layout for a telephone plant.

In 1944 Charlie realized his major ambition for the telephone company: conversion to dial operation. The job was completed with suitable fanfare, and from that day on Worthington residents enjoyed a type of telephone service that only a handful of other communities of similar size could claim at the time.

As the war ended, the demand for more and more telephone service hit Worthington, as it did so many communities in this period. Telephone crews were kept busy extending cable plant, rebuilding rural lines, and installing new equipment. More central office equipment had to be added, and in 1950 an addition to the building was completed to provide badly-needed extra space.

Today here's the way the Worthington Company lines up, with Charlie admitting "we're largely over the hump as far as major projects are concerned":

There are over 3,800 stations, with 1,460 lines providing an adequate margin for immediate growth if necessary. The rural territory served is about 20 miles long and 10 miles wide, and rural plant has been completely rebuilt since the war, eliminating service stations. The saturation point on rural telephones has nearly been reached, with 93 percent of the farms having telephone service, and with service available to every farm within the company's territory. No farm line has more than 10 parties, with full-selective ringing, and the average is slightly over seven per line. The Worthington company has been one of the pioneers in the use of self-suspended aerial cable in the rural areas, and has used this type of construction to eliminate several of its multiple-crossarm leads. Over 200 miles of pole line serve the 500-odd rural patrons.

Within the city proper, the entire cable plant is underground, with the exception of terminals, and many underground installations have been completed into the subscriber's residence.

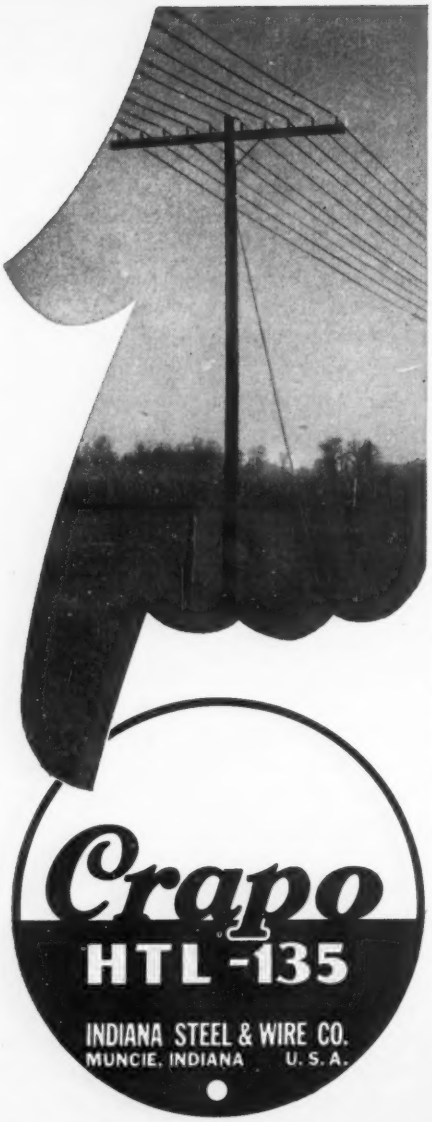
A firm believer that telephone companies must not skimp either on equipment, service or employe relations, Manager Cashel has seen to it that all these phases of successful operation are well taken care of.

Besides its central office equipment, including a six-position toll board, the Worthington exchange probably has more standby equipment than any Minnesota company of comparable size. This includes a 25-kilowatt emergency generator, two motor generators as standby charging equipment for the float-type charger, both A. C. and D.C., standby ringing converters, and interrupters. All this is housed in an immaculately clean ground floor which also includes a supply room, cable vault, repair room, locker room and showers, and a record storage

Please Turn To Page 76

COMMUNITY EVENTS are a time when the "good neighbors" at the Worthington company turn out to do their part. When Worthington had its annual turkey day parade this year, the telephone company entered a float carrying three lovely telephone girls. From left to right, they're Operators NORMA WILLEY and LOIS KUNZE, and DORIS THOMAS (below), billing clerk. The man-sized telephone, incidentally, was borrowed for the occasion from P. M. FERGUSON's Mankato Citizens Telephone Company.

"SANTA CLAUS," IN THE PERSON of STANLEY NELSON, Nobles county clerk of court, put on his special suit one hot September day this fall to reenact how he recorded a message last year for playing to young folks at Christmas-time over the company's "North Pole" telephone number. Over 11,000 telephone calls were completed to this number in 10 days, and the community's still talking about it. Watching the operation is CHARLES CASHEL, secretary-manager of the Worthington Telephone Co.



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The rugged tensile strength of Crapo HTL-135 and its heavy galvanized coating provide dependable and economical service life on typical rural lines.

Ask your jobber for details or write direct for engineering data!

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Muncie, Indiana

vault. The company maintains a separate warehouse and pole yard at the end of town. Five trucks make up its transportation equipment.

"The Coffee Is Always Hot"

AS FAR AS employes are concerned, the company lists 29 on its payroll, including 15 toll operators. Besides its own originating toll, Worthington acts as a toll center for one small Independent exchange, and has four unattended Bell exchanges as partial tributaries. This accounts for a rather unusual volume of long distance work.

The company pays all medical and hospital insurance premiums for its employes, and provides an annuity retirement program for all employes with five years' service. Worthington's operators are probably the luckiest gals in southern Minnesota. Adjacent to their working quarters is a lounge complete with kitchenette, including a refrigerator well stocked with soft drinks (all at company expense). And the coffee is always hot.

The commercial girls have it pretty good too. The front office is a pleasant place to work, and their jobs are made easier by a modern billing machine as well as up-to-date office equipment. Customers' comforts are considered in the provision of desks and chairs for commercial transactions, rather than counters.

Charlie's official title is secretary-treasurer and manager. His two aunts hold down the titles of president and vice-president respectively. Mrs. Blanche Smallwood, widow of Dr. J. T. Smallwood, is the company's president. Mrs. Mildred Slater, the vice-president, was the wife of C. M. Smallwood.

"Healthy Financial Situation"

HOW DOES THE company do financially? Since 1927, when the company was incorporated, the annual dividend of seven percent has never been missed to the preferred stockholders, of whom there are now 18 owning 1,000 shares. There are seven common stockholders, owning the 1,200 shares of common stock outstanding.

The company's last annual report, for 1952, shows a very healthy financial situation. Operating revenues for that year were $195,063, while operating expenses, taxes and

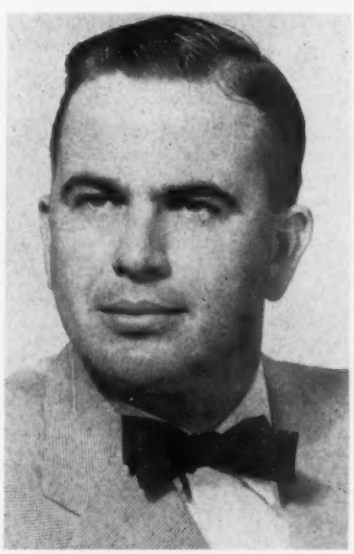
MIKE CASHEL, the 16-year old youngest member of the Cashel family, is no stranger to telephone work either. During the recent summer months he helped out as a lineman, although now he's back at school as a promising quarterback on the Worthington high school football team. Handing him a tool is J. S. PIRTLE, cableman with 32 years of service with the company.

interest totalled $167,765, leaving the company a net income of $27,298. The book value of the plant in service is figured at $701,718 — an investment, incidentally, which grew from a low figure of $107,200 back in 1933, when the company had only 996 telephones in service.

The Worthington Telephone Exchange Company has had three rate increases in the past 12 years, including one prior to its conversion to dial in 1942. Its present rates are for B-1 service, $6.50; R-1, $3.50; R-4, $2.50; and rural, $3.00. Telephone subscribers apparently feel that these rates represent pretty much of a bargain considering the fine service they receive, because there have never been any protests made at the Railroad and Warehouse Commission hearings when rate increases were asked of the state regulatory body.

That's about the story of the "good neighbor" Worthington Telephone Exchange Company, which is practicing the essentials of effective telephony to nearly perfection.

But it wouldn't be wise to think that the company is through planning for the future, and seeking to keep abreast of the industry. Catch Charlie with that twinkle in his eye. "Come back in a couple of months," he'll tell you. "Our new key-pulsing system will be installed and working on our board by then."



CLARENCE A. GUNN, recently returned from service in the United States Navy, will again serve as factory representative of Whitney Blake Co., New Haven, Conn., in the Houston-Dallas district. Mr. Gunn joined the company in Oct. 1951, leaving to enter the service in Feb. 1952.

For Easier Installation

...GREATER HOLDING POWER

use CHANCE "Blackfoot" SCREW ANCHORS

The famous Chance "Blackfoot" Screw Anchor has a more accurately pitched, faster cutting blade than any other type of screw anchor. The method of manufacture—rod and helix are formed separately and then double arc welded together—puts no limitation on the pitch of the helix. Every size anchor is individually "pitch controlled" for fastest installation and greatest holding power.

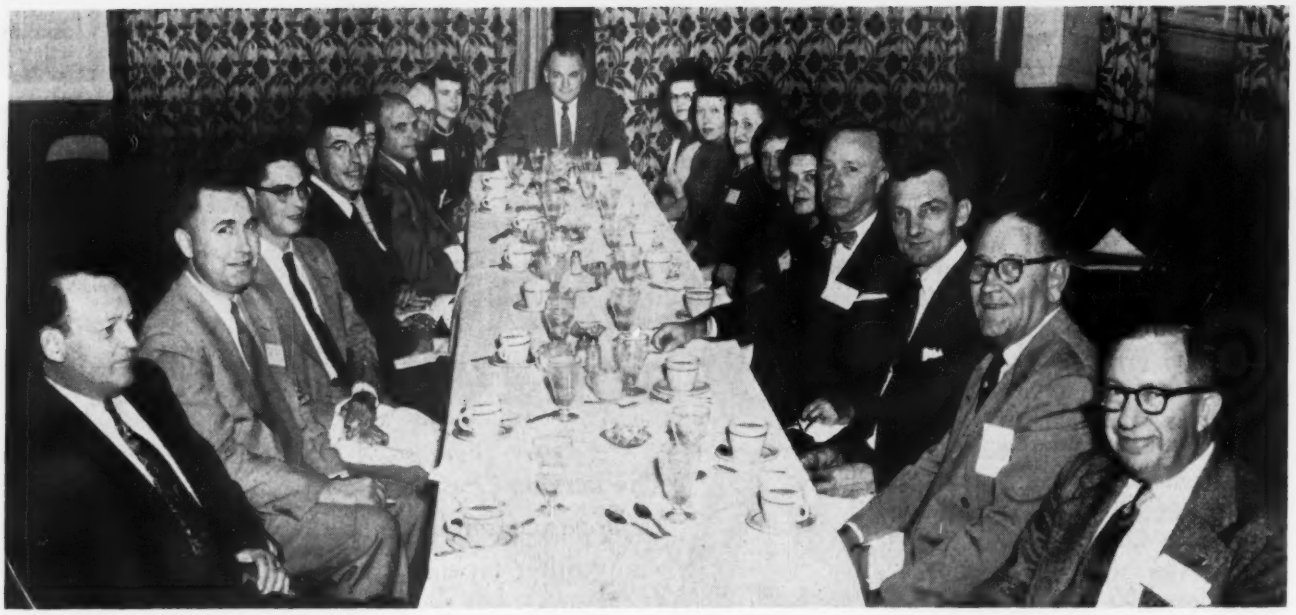
This method of manufacture also permits a small hub that creates less friction and means easier installation. The small hub also reduces earth disturbance during installation and increases the holding power of the anchor.

You know it's RIGHT when you specify CHANCE

A·B·CHANCE CO·

CENTRALIA, MISSOURI
SAN FRANCISCO, CALIFORNIA

ANCHORS • GUYING FIXTURES • LINE CONSTRUCTION TOOLS • CONDUCTOR CLAMPS
GROUNDING EQUIPMENT • HOT LINE TOOLS • HIGH VOLTAGE SWITCHES • CUTOUTS



Officials and staff members of the Illinois Telephone Co., Bloomington, played host to seven teachers of the public school system on Business-Education Day. A tour of the general offices and the Bloomington exchange building was followed by lunch at Hotel Rogers. Informational talks were given by President J. F. Van de Vusse and department heads, and these were followed by a group discussion and a question-answer period. Above (l. to r.) Fox Henderson, plant superintendent; Charles L. Cos (guest); Floyd Vanderwater, assistant traffic engineer; Gerald G. Jackson (guest); Mrs. Dora Mulligan (obscured,) traveling chief operator; H. E. Maurer (guest); H. C. Swartz, auditor; Mrs. Sally Stephens (guest); J. F. Van de Vusse, president; Miss Mary Selk (guest); Mrs. Arnieta Unzicker, chief operator; Miss Lucile Thompson (guest); Mrs. Hazel Umphress, assistant chief operator; Mrs. Doris Lovell (guest); Leon F. Roberts, assistant to the president; G. W. Wopat, general traffic superintendent; J. B. Cherry, district manager; B. C. Schweitzer, general commercial manager.

Warren (Ohio) Telephone Co. Opens New Building To Its Public

THE WEEK of September 21-26 was an important week for the residents of Warren, Ohio, and the Warren Telephone Co., as the community took time out to visit the new telephone building.

Referring to the building's impressive entrance as "Your Doorway To the World" a *Western Reserve Democrat* reporter described his visit to the building by writing, "The door swings noiselessly open . . . The slightest touch and it glides back for one to enter . . . The bromidic 'Push' and 'Pull' which were included in the blueprints are unnecessary . . . One is greeted by soft music, in a spacious, beautifully decorated rotunda, reminding one more of the lobby of a fashionable hotel rather than the entrance to a telephone exchange."

This aptly describes the new Warren telephone building.

The walls of the rotunda are done in a shade of blue with hangings to harmonize. Two huge white columns are fashioned in circular design into seats where customers may rest while waiting to be served.

Two receptionists, to the right as one enters, extend a cordial welcome, but the room as a whole is dominated by the tellers' counter in the rear center. The walls are uncluttered except for two fair-size pictures on opposite walls. One shows an operator at a switchboard on a background of blue which brings out the pastel shade of the wall.

The building, built of steel and masonry construction, represents 15 years of planning.

The first telephone service in Warren was introduced by the Warren-Niles Telephone Co. in 1898 and was succeeded by the Warren Telephone Co., incorporated in 1928. Ten years later the present management acquired the property and took over operation.

As the city of Warren has increased in population the company has grown to meet its need. In 1938 when the present management took

Main office and teller's counter of the Warren (Ohio) Telephone Co.'s building.

Reception clerks at work in new office of Warren (Ohio) Telephone Co.

Warren (Ohio) Telephone Co.'s toll and local billing machines.

over there were 11,244 telephones in operation in Warren. Today there are in excess of 29,270, an increase of 160 per cent.

Each room in the building has been treated with accoustical material to assure a maximum of quiet. Three complete air conditioning units and three electric air cleaning units keep the building shipshape and add to the comfort of both employes and the general public.

The Warren company is the first to provide music in the toll room. The soft tones of classical and popular music permeates every corner of the building. The music originates through equipment within the building and is wired to every room. Records to a length that provide 14 hours of continuous program are provided.

A miniature theatre, seating 46 persons is used for class work in training of employes and provides film educational programs for small civic groups.

The Warren Telephone Co. is

ED REED (left) president of the Lewis (Ind.) Tel. Co. is shown receiving a plaque from R. R. HIRSCHMANN, Indiana Bell assistant vice-president. The plaque — which is to be hung in the Lewis exchange — contains the citation of the Silver Vail Medal awarded to Mrs. DESSIE WELCH at one of the District Meetings of the Indiana Telephone Association.

Telephone subscribers *like to use* telephones equipped with Koiled Kords. This is one of the best reasons why more and more independent telephone companies are specifying Koiled Kords as standard equipment on new phones.

Koiled Kords *make sense* on telephones. They don't kink, are much less likely to catch or break. Damage to equipment falls off sharply when Koiled Kords are used.

The simplest way to have your telephones equipped with Koiled Kords is to buy them with Koiled Kords already attached. Follow the trend towards Koiled Kords as standard equipment by specifying them for all new telephones.

Remember, it's your business to give good service. Use Koiled Kords to help keep customers satisfied, keep maintenance costs down. Koiled Kords for replacements are also available from independent telephone suppliers trimmed to fit all standard hand sets.

Koiled Kords
INCORPORATED

BOX K
NEW HAVEN 14, CONN.

ADHESION TESTS SHOW THE CONDUCTOR BREAKS BEFORE LOWELL INSULATION SLIPS

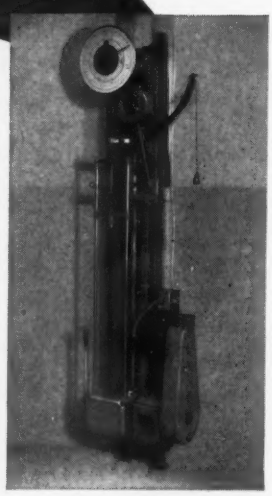
No. 2 in a series of test results on LOWELL TELEPHONE DROP WIRE.

"P Clamp" adhesion test.

The greatest strain on drop wire takes place at the "P Clamp" where the wire is attached to pole or house. The weight of ice and the whipping action of the wind develop extra strain at this point so that the best possible bond is essential, between the insulation and the conductor wire, to insure dependable service and long life.

To develop the strongest possible adhesion, all Lowell wires are brass flashed and special formulas have been evolved for insulation compounds. Lowell jacket compounds also have excellent resistance to abrasion and the ability to withstand the action of the elements under varying atmospheric conditions.

As a constant check, tensile tests are made at the Lowell Laboratories where the conductors are stretched to their breaking point before any slippage of the insulation or jackets takes place. These rigid laboratory tests are your assurance that Lowell Drop Wires will stand up under the most severe conditions and give dependable service without breakdown at this most critical point where the grip of the "P Clamp" must support the entire weight of the span. Year marker threads and manufacturer's identification permit user to keep accurate records of performance and long life in service.



Lowell Drop Wires are continually tested for adhesion of the insulation to the conductor. The conductor must break before the adhesion bond between the insulation and conductor is severed.

Write for Lowell Insulated Wire Catalog

"fine wires only"

LOWELL INSULATED WIRE DIVISION OF The Overlakes Corporation

121 LINCOLN STREET ... LOWELL, MASSACHUSETTS

headed by Gustav Hirsch, Columbus, president; Ralph F. Mateer, vice-president and general manager; A. B. Wright, secretary and A. F. Reed, treasurer.

Missouri Assoc. Holds Three District Meetings

THE MISSOURI Telephone Association held District Meetings at Cameron, Macon and Springfield during September.

George A. Hearne, president of the association, presided and addressed the three meetings. He said that, "the Association appreciates the time and efforts of the members of the Small Company Committees in working on the assistance program this year. The Assistance Program services are growing and are available to those who can use assistance and who are willing to help themselves. If you need some help, we will be glad to pool our efforts with yours for your benefit and the benefit of the whole industry.

"Many of us could do a little more to aid this important program and spread the time and effort around so that no one will be really burdened in helping our Missouri industry. In

REA recently announced apointment of WILLIAM EASTMAN as assistant chief-staff planning, Telephone Engineering Division. Mr. Eastman, a graduate in engineering from the University of New Hampshire, joined the REA Staff in July 1938 and since that time has been engaged in electric and telephone engineering work. He served as section engineer in the Engineering Division from Dec., 1949, to July, 1952, and since that date as Section Engineer, Western Section, Telephone Engineering Division.

JOHN J. FOLEY (above), for 25 years commercial manager of the Michigan Bell Telephone Company's northern division, who recently retired, became commercial manager of The Elyria Telephone Co., Elyria, Ohio on Nov. 1. Mr. Foley is a Bell System veteran of 45 years. He started his telephone career with The Bell Telephone Company of Pennsylvania in 1908 and went to Michigan in 1916.

helping others, we too are learning more than you might think. It is a suitable reward for our efforts. Pitch in and give a bit of your time and experience to this valuable program."

At the morning sessions, the associations' Small Company Committees put on a program. Joseph L. Van Horn, chairman of the General Small Company Committee, reviewed the various activities of each of the District Committees for the past eight months. He expressed appreciation to the committee members for their cooperation on the program. He said that over 300 assistance items had been carried out this year which include such things as:

(1) Setting up adequate accounting records.

(2) Market surveys.

(3) Financing of improvement programs.

(4) Dial and common battery conversions.

(5) Applications for and securing rate increases.

(6) Reorganization of business structure of small companies.

(7) Acquisition and consolidation of exchanges.

(8) Filing of exchange area maps and tariffs.

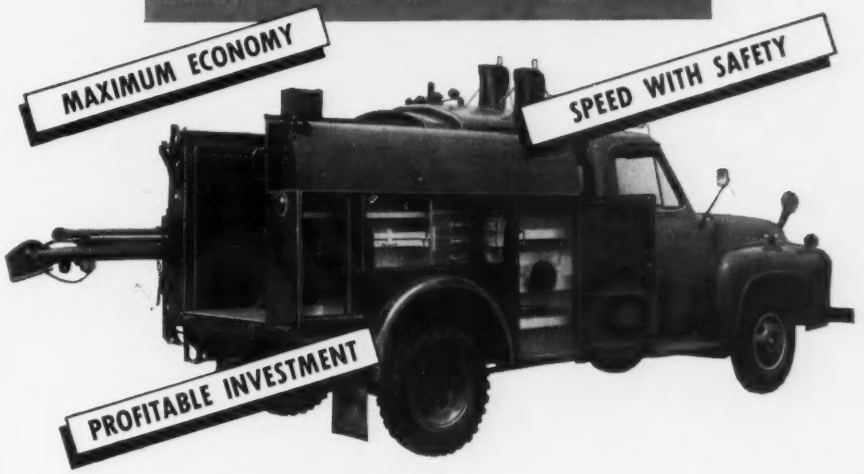
(9) Making of appraisals and inventories of plant.

At each of the meetings members

5000 WD

the New

YORK-HOOVER
TWO-MAN
LINE BODY



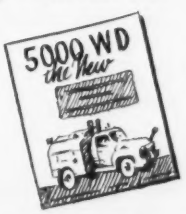
model 5000 WD is a sound investment for YOU...

because it will do your line work *at less cost—quicker* and *safer.*

With complete equipment it will dig the hole and set the pole, normally in a matter of minutes, all within full view and control of the truck operator.

Backed by 61 years' experience and embodying skillful engineering and honest workmanship, the model 5000 WD body with equipment represents a truly outstanding investment.

Before you purchase any line equipment, make sure you have thoroughly looked into this modern, up-to-the-minute unit by York-Hoover.



GET THE FACTS! Write for Bulletin No. 931 today.

York-Hoover Corporation
YORK, PENNSYLVANIA
Body Division

of the District Committees spoke on how to handle specific types of assistance projects. This kind of participation gives the members self assurance and helps the program materially. At the regular monthly meetings of the District Committees, all companies in the particular district are invited and selected subjects on the business are discussed by qualified speakers as a part of the educational and training program of the committee.

Homer Thorpe, chief accountant of the Missouri Public Service Commission discussed at each of the meetings the "Preparation of Annual Reports by Independent Telephone Companies." He emphasized the importance of each telephone company setting up and maintaining adequate accounting records on plant investment. Any company wanting to carry out an improvement program will need this data for rate, engineering and financing purposes.

Mr. Thorpe pointed out that "some of the annual reports as filed are incomplete." He asked and will receive the cooperation of the Association Small Company Committees in assisting these small companies in the preparation of the reports and the setting up of a set of simple bookkeeping records. The committees will be assisted by a representative of Mr. Thorpe's office in working out this project.

R. W. Hedrick, secretary of the Missouri Telephone Association discussed some of the many problems of the telephone companies handled through his Jefferson City office.

Mr. Hedrick has been helpful in handling various matters for member companies with the Commission Staff and with other State Departments. Since the Association Assistance Program has been activated, the volume of legal matters in his office has increased materially.

He mentioned that the Independent telephone companies in Missouri have filed exchange area boundary maps in all but 60 exchanges and the Commission Staff appreciates the assistance of the District Committees in getting this important activity accomplished. It is hoped that the maps for the remaining exchanges will be prepared and filed as soon as practicable.

Mr. Hedrick again emphasized the need for and importance of telephone companies having adequate accounting records.

The meeting at Cameron sponsored by the Middle States Utilities Co., of Missouri was attended by 22 companies and 41 exchanges. The Missouri Telephone Company showed that at the Macon meeting 20 companies and 41 exchanges were represented. The Springfield meeting sponsored by the Western Light and Telephone Co., Inc., brought representatives from 42 companies and 58 exchanges. Four hundred persons attended the meetings.

Plant and Traffic Conferences were held each afternoon following the luncheon.

No. Carolina Assoc. Meets at Pinehurst

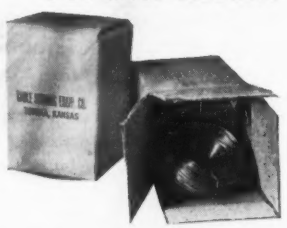
IN THEIR ANNUAL convention held late in October at Pinehurst, North Carolina's Independent telephone people were praised by the State Utilities Commission chairman, Stanley Winborne, who pointed out that only recently the companies have spent 10 times more on new equip-

Rx for Double-Purpose Jobs

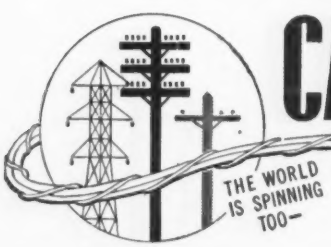
Here's the Neale Model K Pull Type Spinner—engineered for versatility. It's doing a great job on electric power lines . . . and telephone lines, too! Model K has a maximum capacity of three 2" O.D. cables, and will spin single cable as small as 5/8" O.D. This spinner may be used with either one or two coils of spinning wire, so you may have either a 13" spiral or wire 6½" apart. Model K is furnished with two LC5 Lashing Wire Clamps, tow rope, cable placing dolly, and chest.

Contact your jobber

Use Neale Wire For Best Results



Available in 7 different types. There's just the wire for your particular requirements.



CABLE SPINNING Equipment Company PHONE 2-7234

3100 TOPEKA AVE. TOPEKA, KANSAS

STANLEY E. WINBORNE, chairman of North Carolina Utilities Commission, registers as guest of North Carolina convention.

ment and improved services than ever before. Winborne stated that the telephone companies had many problems which were brought to the attention of the Utilities Commission and that the Commission had attempted to be fair, both to the companies and the public in their decisions on these problems.

George E. Brewer, well known telephone executive from Chicago, went into the business of employe morale in his address before the convention. Management's failure to realize the importance of good employe relations frequently results in poor employe morale, according to Brewer. Being friendly and helpful toward a new employe, while at the same time, getting him into productivity as rapidly as possible are of utmost importance.

The role of government in business was discussed by Clyde S. Bailey, executive vice president of the United States Independent Telephone Association, who declared that Washington often has blamed industry for various shortcomings, while at the same time the government has participated in the very things that retard business.

A professor from the University of North Carolina, Dr. R. P. Calhoun, gave the gathering some hints concerning "blind spots" in human relations and misconceptions on the part of management. Dr. Calhoun is professor of industrial relations at the State University.

Edwin Gill, state treasurer, appeared before the convention to discuss state financing. "We are proud," Gill declared, "that North Carolina is conservative without being reactionary."

R. R. Stubbs, vice president of Southern Bell Telephone & Telegraph

"Of all the sentences describing the telephone industry and its problems, we like best a four-word prediction noted in a bulletin sent out recently by an associated company. Starting with a capital letter, and ending with a period, the dramatic sentence reads: — 'The future lies ahead.' " — The Northwestern Bell.

● ● ●

"Under the free enterprise system, the individual has the incentive to work and save and invest and profit thereby so long as he harms no one else in the process. His future depends upon his own ambition."— Cascade (Idaho) News.

"...and you KNOW maintenance will be low!"

General Cable
PAPER-INSULATED
CABLE

GENERAL CABLE

You don't take chances when you buy General Cable Paper-insulated Cable—the records prove it's as maintenance-free as cable can be! It's carefully made of high-conductivity wire, dry paper, and strong, antimony-lead sheathing, and is pressure-tested for 24 hours before shipping. Ask for prices now on all standard gauges and number of pairs.

Buy Automatic's APPROVED Supplies
Highest Quality
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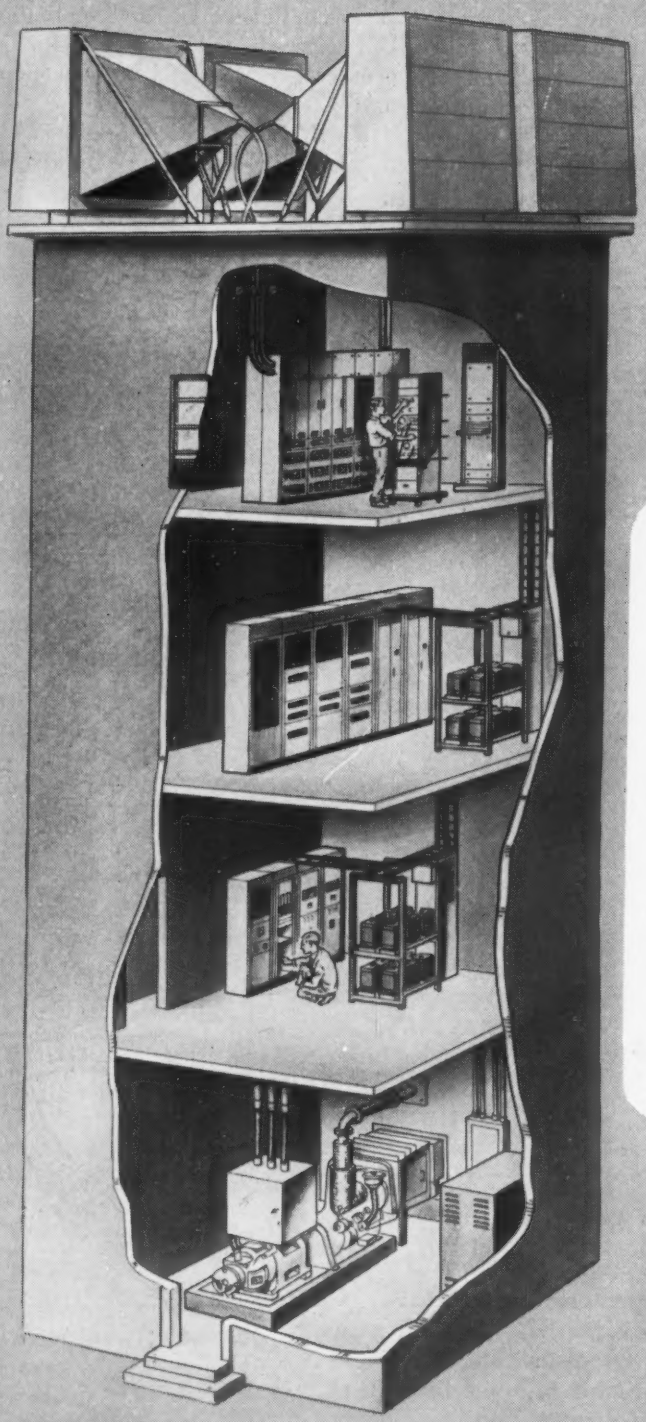
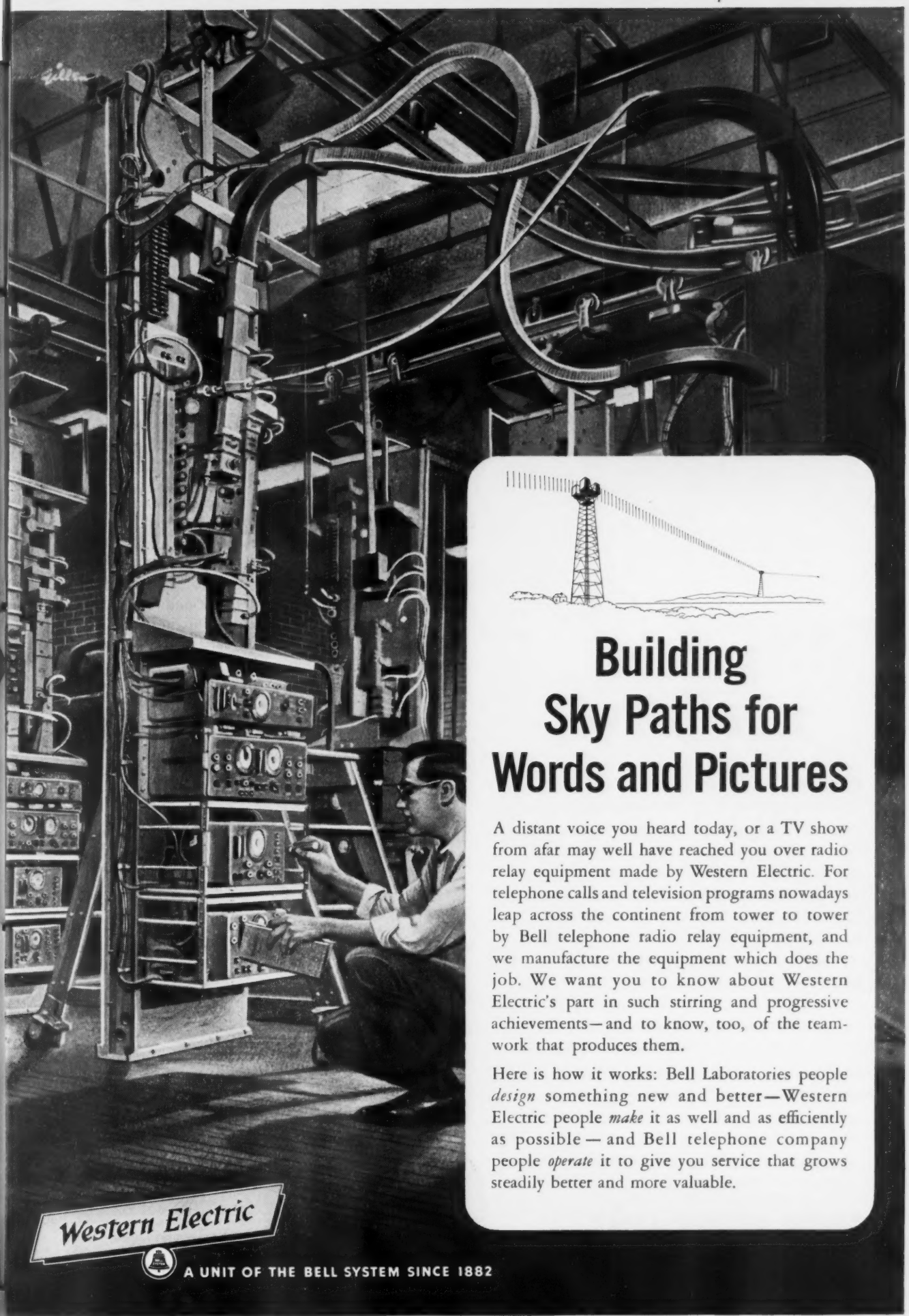


Inside Story

Bell System radio relay towers of concrete or steel can be seen in many parts of the U. S. nowadays. Little does the average person realize that they house complex receiving and transmitting equipment like that being tested at a Western Electric plant —as shown on the opposite page.

In order to tell the public about one of the great technological advances that makes telephone service better than ever and of the teamwork that helps make this possible, Western Electric has placed the advertisement reprinted at the right in selected general magazines.



Building Sky Paths for Words and Pictures

A distant voice you heard today, or a TV show from afar may well have reached you over radio relay equipment made by Western Electric. For telephone calls and television programs nowadays leap across the continent from tower to tower by Bell telephone radio relay equipment, and we manufacture the equipment which does the job. We want you to know about Western Electric's part in such stirring and progressive achievements—and to know, too, of the teamwork that produces them.

Here is how it works: Bell Laboratories people *design* something new and better—Western Electric people *make* it as well and as efficiently as possible—and Bell telephone company people *operate* it to give you service that grows steadily better and more valuable.

Western Electric

A UNIT OF THE BELL SYSTEM SINCE 1882

Specify the
PEC 369 DUPLEX REPEATER
for reliable teletype service

THE PEC 369 Duplex Repeater is especially designed to meet requirements of railroad teletype services and is widely used by many of the Nation's large railroads. It is compact, simply adjusted and easily maintained.

The PEC 369 Duplex Repeater uses the high speed circuit covered in AAR Spec 2K22 and provides a wide operating margin in teletype service. One of the outstanding advantages of this Duplex Set over other types, is the fact that all adjustments and checks of operating conditions can be made without the use of external equipment, since test keys, meter and morse key are all an integral part of the PEC 369 Duplex Repeater. In other words this Duplex Set includes its own test facilities.

The set is arranged for relay rack mounting, has an efficient rear dust cover and has an overall panel height of *only* 14 inches. Operating instructions on this Duplex Set should be of interest to all communications groups. Your copy will be sent to you upon request.

POWER EQUIPMENT *Company*

Battery Chargers ☆ Battery Eliminators ☆ D.C. Power Supply Units ☆ Regulated Exciters ☆ and other Special Communications Equipment

5740 NEVADA, EAST / DETROIT 34, MICHIGAN

L. W. HILL, left, and R. R. STUBBS, featured speaker on North Carolina convention program, catch a few minutes for private discussion and relaxation.

Co., declared that cost increases, added demands for telephone service, rates and financing have been top problems facing the telephone companies in recent years.

A telephone company can go broke just like the corner grocery or any other business, Stubbs reminded, and it is important that the public be informed that a telephone company is a private enterprise and not a state supported institution. The installation of additional telephones at present cost levels depreciates the telephone business by a process of diminishing returns, Stubbs declared, and these factors are little known and seldom taken into consideration by the public. The subject of Stubbs' address was, "Telephone Service is a Bargain."

At the directors meeting, J. F. Havens, vice president of Carolina Telephone & Telegraph Co. was elected president of the association for the forthcoming year. Other officers and directors elected at this meeting were: Vice President, L. S. Blades

Enjoying themselves at the annual North Carolina convention in Pinehurst, left to right, MRS. C. S. BAILEY, L. W. HILL, of Carolina Telephone & Telegraph Co., RALPH VAN TRINE, of Durham Telephone Co., and G. E. BREWER, Telephone Services, Inc., Chicago.

PEOPLE IN THE NEWS

HAROLD E. SMITH (above) has been appointed director of market research of Thomas A. Edison, Inc. Mr. Smith will serve the needs of the company's seven divisions and subsidiaries. Doing special market investigations for the Edison Instrument Division since 1950, Mr. Smith will also guide Market Research for the Ediphone, Storage and Primary Battery and Medical Gas Divisions and for two subsidiary companies . . . Edison Wood Products and Measurements Corporation.

F. C. GOKEY, executive vice president, of the Highway Trailer Co., Edgerton, Wis., has announced the appointment of RAYMOND O. HAHN (above) as Manager of the company's Cincinnati Branch. For the past three years Mr. Hahn has been employed as a salesman at the Cincinnati Branch.

Admiral CURTIS S. SMILEY (above) recently joined the Sterling Engine Co., Buffalo, N. Y., manufacturers of Sterling Diesel engines and generator sets, as assistant to the president. Admiral Smiley recently retired after 30 years' service in the U. S. Navy. At the time of his retirement Admiral Smiley was Chief of Staff, Commander, Eastern Sea Frontier Headquarters, New York City. His business address will be the general offices of the Sterling Engine Co., 1270 Niagara Street, Buffalo, N.Y.

Holtzer-Cabot Telephone Equipment Division of National Pneumatic Co., Inc., and Holtzer-Cabot Divisions, Boston, Mass., recently announced the appointment of C. H. ACHENBACH (above) as consulting engineer in the development of the telephone power equipment. Mr. Achenbach had been for 38 years with the Bell System, 22 years of which were spent in laboratory development of power supplies for the system's transmission and central office equipment. For the last 10 years he has had charge of power engineering and development work for the Bell organization. During World War II he was similarly engaged in supplying the armed forces with power equipment, including radar units, gun directors and communication devices.

The appointment of ARTHUR B. CASCONE (above) as Manager of the Newark, N. J. Branch was announced recently by the F. C. Gokey, executive vice president, of the Highway Trailer Co., Edgerton, Wis. Mr. Cascone has been active in the trailer sales field for more than 10 years.

J. A. FRABUTT has been appointed general sales manager of Federal Telephone & Radio Company, a division of International Telephone & Telegraph Corp. Mr. Frabutt fills the vacany on Federal's Administrative Staff created by the recent designation of Mr. Perry, formerly vice president and general sales manager, as president of the company. Mr. Frabutt, who has served as manager of sales to government agencies since 1946, joined Federal in 1939 as a radio engineer. Until his promotion to the government sales managership, Mr. Frabutt, a specialist in airplane navigational and communication systems, was closely identified with the technical development of airplane instrument landing systems.

of the Norfolk & Carolina Telephone Co.; Vice President, R. E. McKelvey of the Western Carolina Telephone Co.; Vice President, E. D. Freeman of the Sand Hill Telephone Co.; and Secretary and Treasurer, E. B. Fowlkes of the Carolina Telephone & Telegraph Co.

New directors are: W. S. Beddingfield of Central Telephone Co.; L. W. Hill of Carolina Telephone & Telegraph Co.; Mrs. J. D. Morris of the Morris Telephone Co.; Ralph Van Trine of the Durham Telephone Co.; and Robbins Tilden of the North State Telephone Co.

Arkansas Independents Meet at Hot Springs

THE ARKANSAS Telephone Association held its biggest convention ever this year at Hot Springs September 21 and 22.

A record 200 telephone people and guests registered for the 31st annual convention to hear prominent speakers talk about private enterprise and the telephone business, and to attend some unusual workshops designed for group discussions on operating problems.

President R. D. Tucker's report to the convention revealed that the association had one of its busiest years on record in 1952. It started with the state legislature early this year when several bills were introduced that, if passed, would hamstring efforts to get reasonable rates, and hamper operations in general.

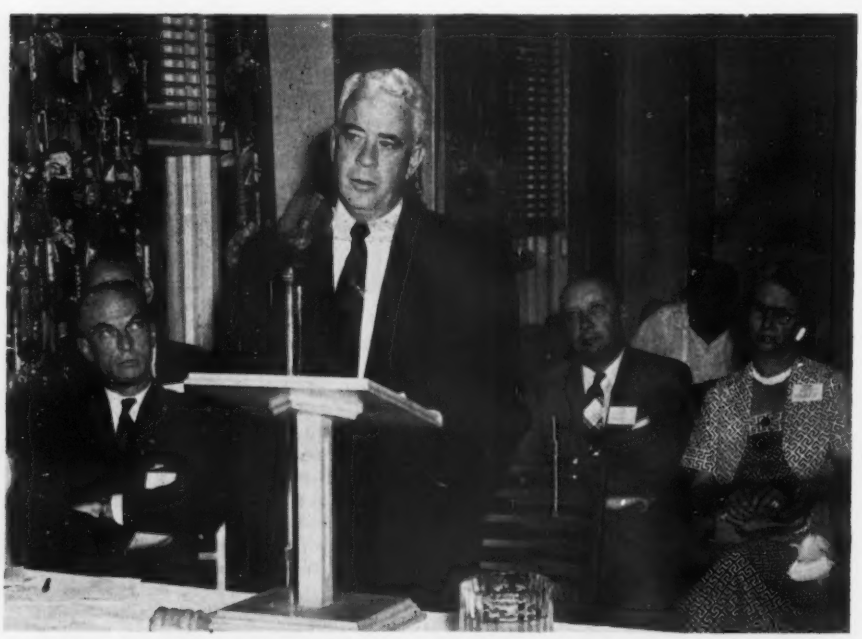
Among the bills fought by the association, Tucker recounted, were three to change the bond law that allows utilities to collect rates under bond until hearings have been completed. These were defeated before being put to a vote. Other bills would have required that all directories be printed in the state, a state tax on all telephone facilities, and that rate case expenses be paid by utilities — including those incurred by opposing factions.

The association worked successfully to help beat down these bills, which would have set the business back several years, the president said.

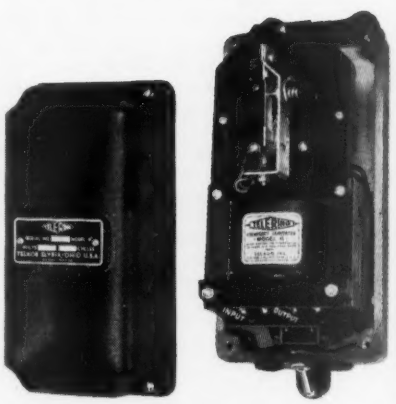
Mr. Tucker cited the work of the association's Small Company Assistance Committee in devising methods of placing loans and selling stock. A noteworthy movement along this line was the sponsorship of a tour over the state with B. Hollon Smith, vice president of the Bankers National Life Insurance Company, Montclair, New Jersey, and T. W. Mahon, assistant cashier of Chase National Bank, New York. The tour was made to gather information for making long-term loans to small companies, and already some results are being seen.

Another association-sponsored program was setting up in collaboration

Please Turn To Page 92



GOVERNOR FRANCIS CHERRY, speaking to the 31st annual convention of the Arkansas Telephone Association in Hot Springs, tells his listeners they should do more to let the public know what a good job they are doing. Listening are Retiring President, R. D. TUCKER, Crossett, left; R. L. BANKSON, general commercial manager for Southwestern Bell in Arkansas; and MRS. VIRGINIA HIRSCH, Mountain Home Telephone Co.

Construction M
With the Double Gu
and America's le
for TELEPHONE
RINGING POWER

Model "R"
4" x 4½" x 10"
Wt. 7½ lbs.
TELERING
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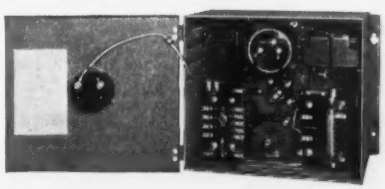

RFR 1044-GR RectiFilteR with door open

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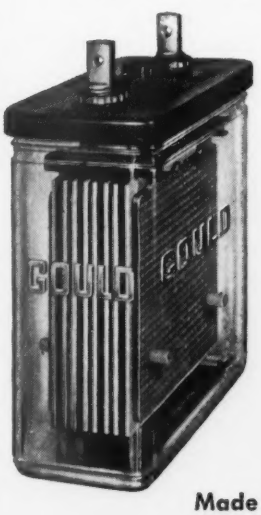

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TELEPHONE ENGINEER & MANAGEMENT
January through December, 1953

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MISS LULA CALLAHAN, a telephone operator at the Adrian, Mich., Exchange of the Union Telephone Company recently completed 35 years as an operator at the Adrian office and co-workers, present and past, and company officials attended a banquet in her honor. 105 persons were present at the banquet, and congratulation telegrams, flowers, and gifts were received from friends who were unable to attend. The climax of the evening was a takeoff on the television program "This Is Your Life" arranged by Miss Lydia Mielke, traffic supervisor. Many of Miss Callahan's co-workers took part as the story of her life was enacted, revealing her loyalty, modesty, and patience throughout her years of service to the Adrian community as a telephone operator. A memory book of white leather, containing the story of her life as it was reenacted by her fellow employes, was presented to Miss Callahan after the drama.

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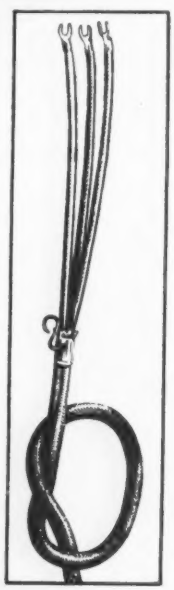

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CORDS FOR ALL MAKES AND TYPES OF TELEPHONE INSTRUMENTS

Arkansas Meeting

Continued From Page 88

with Southwestern Bell a series of training sessions in preparation for operator toll dialing. A member of the board of directors headed up these sessions in each district.

The president ended his report by urging a membership drive during the next year to bring in as many as possible of the remaining 26 companies that do not belong to the association; and gave them this admonition: "Better your service whenever you can. You owe this to your customers. And get to know your public service commissioners so you can better work together to solve your problems."

Good Neighbor Policy

S. A. (GUS) LANE, long-time board member and leader in the association, who owns the Western Arkansas Telephone Co., pointed up the good-neighbor policy that exists among companies in the state. He cited his own case in Russellville this summer when a wind and rain storm deluged the switchboard room and knocked out much of his outside plant. He was in Philadelphia at the time, but telephone neighbors came in to help restore service.

"We all should continue to promote the good-neighbor policy among ourselves," Mr. Lane said.

On the morning of the convention's opening day, the group heard C. Hamilton Moses, chairman of the board, Arkansas Power and Light Company, speak on "Private Enterprise — You Can Make It Work." He implored them to take an active interest in building the community. If you make your community a better place to live, it will certainly be a better place to do business in, he said.

Clyde McFarlin, general counsel of the Iowa Independent Telephone Association, brought new emphasis to the danger of possible national legislation detrimental to the industry. He warned that the next session of Congress will bring an attempt to hoist the minimum wage to $1 an hour. If it's successful, the Independent companies will have to get busy and get the 750 station exemption raised.

"Some of us have spent considerable time in Washington educating

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our Congressmen on the communications industry," he said. "But this is a job that all of us can work on. And it's a mighty important job."

Mr. McFarlin recounted what his association has done to help individual companies in establishing modern telephone service. The nucleus of this effort was his organization's Small Company Assistance Committee. It concentrated on the idea of encouraging the communities to buy stock in a company so it could improve its facilities. Attention was also directed to local banks in this method of financing.

The new state administration came in for some praise from General Counsel, P. A. (Judge) Lasley, in its attitude on matters involving public utilities. He said the governor has appointed to the Public Service Commission "three honest and fair-minded men who are primarily interested in efficient service." He added that they are sympathetic with the public utilities in their problems and will give all the assistance they can.

Hollingsworth Elected Pres.

NEW OFFICERS elected for the coming year were: T. B. Hollingsworth, division manager, The Southwestern States Telephone Co., Stuttgart, president; John Carter, Union Telephone Co., first vice president; H. R. Wilbourn, Grant County Telephone Co., Sheridan, second vice president; and J. D. Garrett, Walnut Hill Telephone Co., Lewisville, secretary-treasurer.

If the conventioners weren't aware when they arrived of how important it is that customers place long distance calls by number, they were before the meeting was over. "Call by Number" was carried out as the theme of the convention in various ways.

The identification badges had printed on them a Razorback hog running in full stride, with the call-by-number message overprinted.

Several cartoon posters were set up throughout the convention, urging the Independent owners to remind their customers to call by number. Two huge banners with this message painted on them were hung — one in the lobby of the Majestic Hotel (the meeting place), another in the meeting room.

Finally, napkins were printed carrying the Razorback hog scheme and were used at the open house.

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Dependability counts heavily in the Telephone Industry — one reason why Raytheon RectiChargeRs are so widely used.

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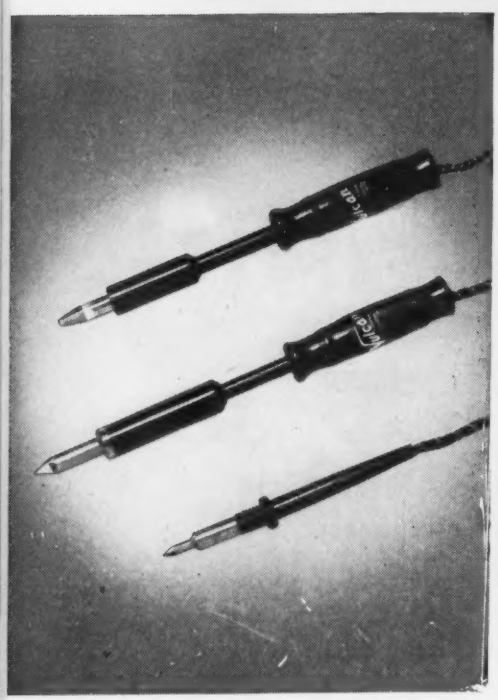

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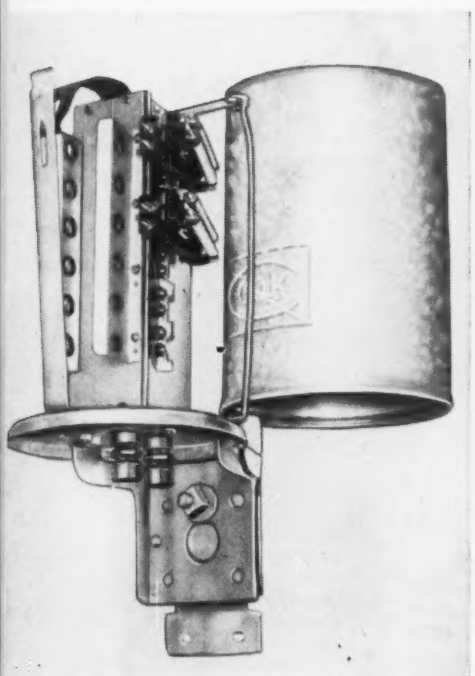

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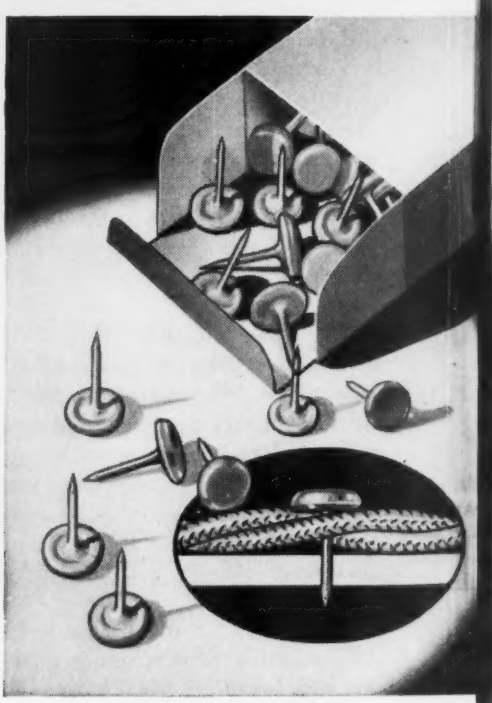

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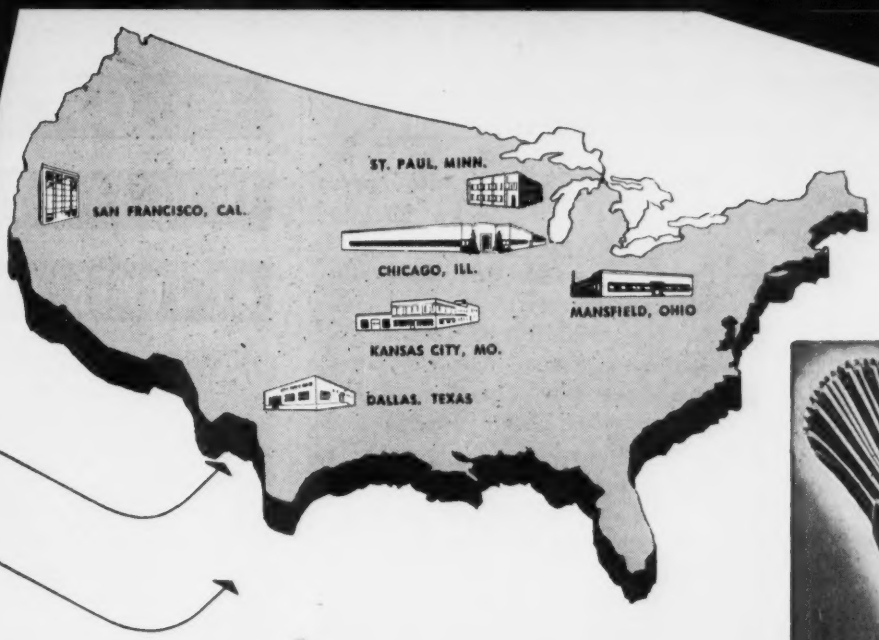

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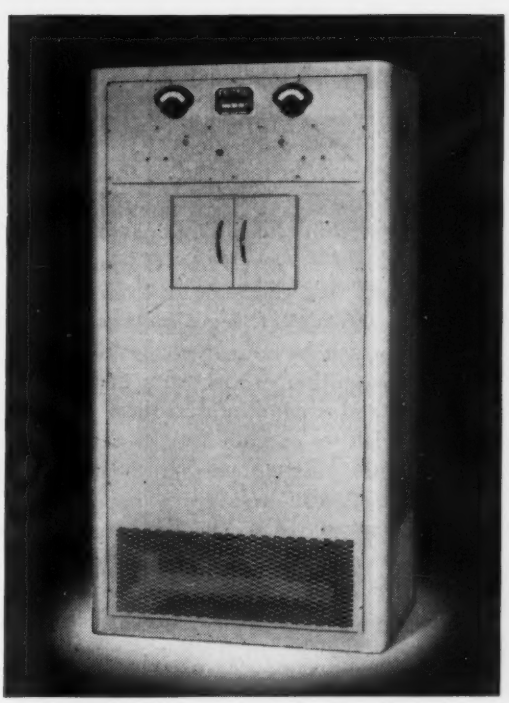

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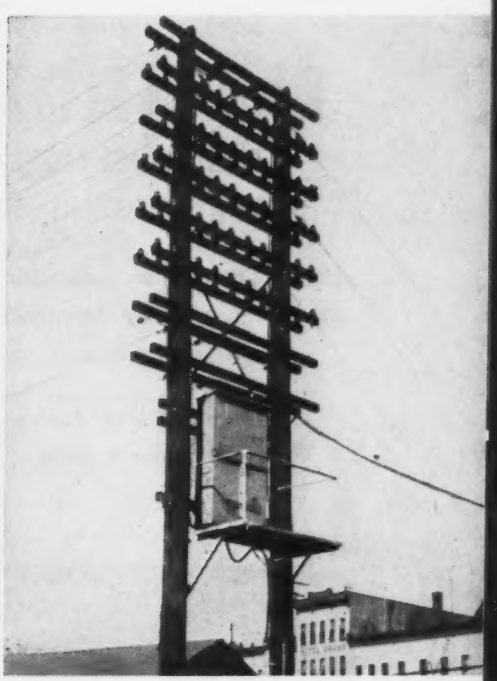

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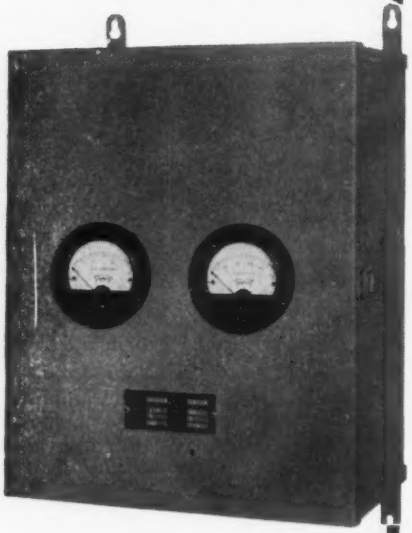

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Rocky Mountain Assoc. Meets In Salt Lake

THE SEVENTH annual convention of the Rocky Mountain Telephone Association opened at the Newhouse Hotel, Salt Lake City, Utah, on the morning of September 24 with an address of welcome from Gus P. Backman, manager of the Salt Lake City Chamber of Commerce. Mr. Backman wished the some hundred members of the association who were on hand success in their meetings during the convention and made them welcome to Salt Lake City. The Rocky Mountain States were well represented and representatives of the manufacturers and suppliers of telephone equipment were on hand with exhibits of their products.

President Mills Roberts, General Telephone Co. of the Northwest, presided at the sessions. After thanking Mr. Backman for his kindness in extending a welcome to the convention members, President Roberts introduced the first speaker.

W. K. Koch, president of The Mountain States Telephone & Telegraph Co., Denver, Colo., spoke on the topic, "Over the Hill."

Mr. Koch told the convention — "If we are not willing to face the fact that we are a service institution, that our future is dependent upon good service to the public, that the economic life of the communities we serve is dependent upon our service, then I think we are running away from reality, then I feel that our ultimate goal is basically wrong and we are on the road to the poorhouse."

"Just think what any community would do today without telephone service," he said. "The towns you serve and that we serve are communities which have in them people that have ambition, who have a desire to grow and expand, and as these towns in which we operate have grown during this postwar period, they have become more and more dependent upon telephone service. Along with the town itself is the employe group. If we are not willing to do those things which are necessary to assure dependable, conscientious, efficient employes, then we are again unwilling to face reality and the hill is the road to the poorhouse."

Stating that all of these problems

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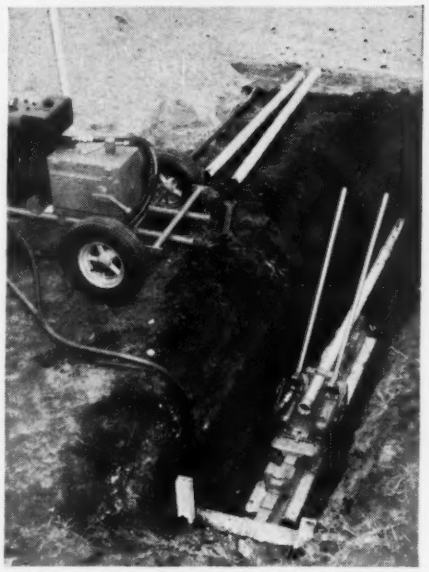

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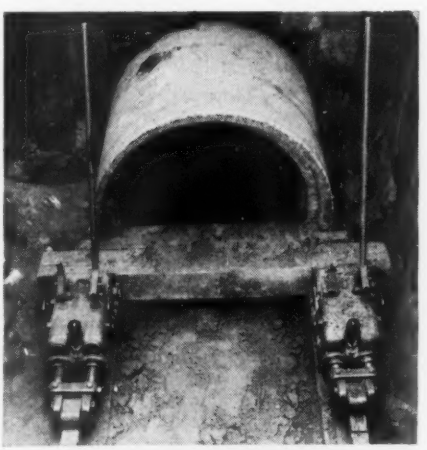

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then relate themselves to the major and most fundamental issue facing the industry today, namely, that of obtaining reasonable and substantial earnings, Mr. Koch said that, "since we are in a period of inflation, the dollar which we take in for our service is buying less and less in the nature of employes' services and in the nature of goods and material which we need to operate our business."

"Assuming that we are doing an efficient, scientific, reasonable job of running our organization," he said, "then the only way that we can protect the interests of our stockholders, our employes, and our public is to get increases in rates. That is a difficult job. And if your business is like mine, the only way you are going to get new equipment to take care of the continuing demand for telephone service is to issue stocks or bonds or secure bank loans, and all of these are dependent for their success upon a reasonable and continuing rate of earnings which will attract investors to our business. So far as I know there is no telephone company which can finance itself out of its own earnings, and so must depend upon the public to provide us with the new capital for the expansion which this business must make."

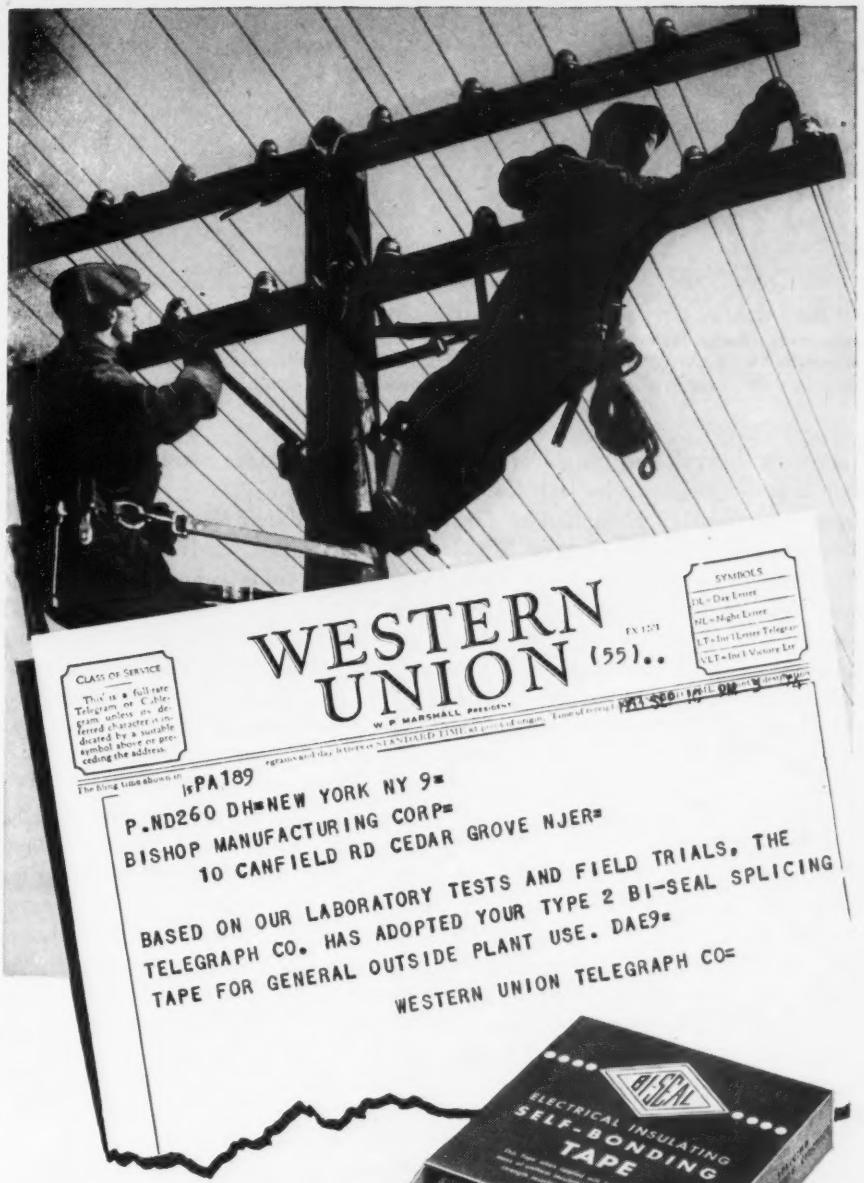
Larry Dodds followed the talk by Mr. Koch with a 15-minute period demonstration on microwave, which the listeners found most entertaining and helpful in giving them a picture of the talk "Over the Hill."

At this time President Roberts reported on the affairs of the Association for the past year, complimenting the work of the Committee on Small Company Affairs, which is headed by Chairman T. Clark Callister. The Report of the last meeting was read by Secretary-Treasurer, J. W. Baker, as well as the financial report of the Association.

"The Washington Reporter" was the subject of the address presented by E. M. Blakeslee, 1952-53 president of the United States Independent Telephone Association, and president of the General Telephone Co. of California, Santa Monica.

Adjournment was made at 12:00 noon, with the afternoon session at 2:00 p.m. opening with an address, "Plant Planning and Small Dial Conversions" by Robert Brown, manager of the Parma Telephone Co.

The films, "Longer Pole Life with



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Speakers table at Rocky Mountain Telephone Association convention. (l. to r.) J. W. BAKER, secy.-treas., Rocky Mountain Tel. Assoc. Coeur d' Alene, Idaho; MILLS ROBERTS, pres. Rocky Mountain Tel. Assoc., Memphis, Texas; W. K. KOCH, pres. Mountain States Tel. & Tel. Co., Denver, Colo.; and E. M. BLAKESLEE, 1952-1953 pres., United States Independent Tel. Assoc., Santa Monica, Calif.

Increased Safety" and "Right of Way Brush Control" shown by Dan Kamphausen of the Dan Kamphausen Co., Denver, Colo., for the Osmose Wood Preserving Co. of Buffalo, New York, were shown to an interested audience. They were well worthwhile and enjoyed by the members. The balance of the afternoon was devoted to attending the exhibits given by the manufacturers and suppliers, who had their latest equipment on display.

The banquet at 6:30 p.m. in the Bonneville Room of the Newhouse Hotel was well attended. The entertainment features were under the direction of Fielding K. Smith. Since Mr. Smith had acted in this capacity at several previous banquets for the Rocky Mountain Telephone Association, those who had attended before were ready for the witty "M. Cing" of "Smat" Smith.

The general session at 9:30 a.m. Sept. 25, opened with an address by R.P. Sullivan, General Traffic Superintendent, General Telephone Company of the Southwest, Dallas, Texas.

The final address of the convention was given by Harry Diston of the American Telephone & Telegraph Co., New York, N. Y. Mr. Diston is Independent Company Relations Engineer for that company and his talk on "Long Range Planning for Nation-wide Customer Dialing" gave the members a well rounded discussion on that interesting subject.

The following officers and directors were elected to the Board of the Rocky Mountain Telephone Association to serve for the ensuing year: R. A. Manuel, Browing Telephone Co., Browing, Mont., president; C. M. Hart, Citizens Utilities Co., Kingman, Ariz., vice-president; J. W. Baker, Coeur d'Alene, Idaho, secretary-treasurer; Ward W. Blazzard, Kamas-Woodland Tel. Co., Kamas, Utah; Robert Brown, Parma Tel. Co., Parma, Idaho; T. Clark Callister, Millard County Tel. & Tel. Co., Fill-

Please Turn To Page 100

Officers of Rocky Mountain Telephone Assoc. (l. to r.) MILLS ROBERTS, president; J. W. BAKER, secretary-treasurer; R. A. MANUEL, vice president.

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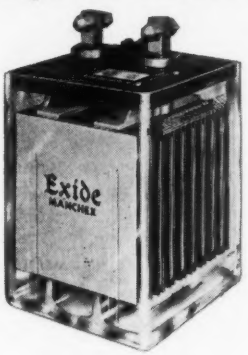

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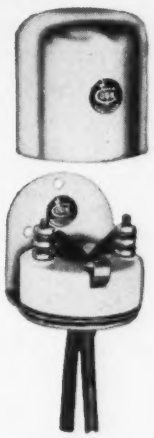

Built of lighter alloys, the new Cook Testerm Drop Wire Connector provides better insulation, reduces shipping costs, simplifies installation, occupies less space and further improves the connecting methods of subscriber drops to open wire.

Overall dimensions of the unit have been reduced but the spacing between the conductors is the same as the original design.

The base and cover are detachable from the mounting bracket by a bayonet locking arrangement of three Everdur studs that are "upset" to prevent loss of nuts during installation. These nuts fit the standard socket wrench. Wire entrances are sealed by a Neoprene gasket to prevent the entrance of insects, dirt and moisture.

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Members of the Executive Committee are: R. A. Manuel, C. M. Hart, J. W. Baker, Clark Callister, and D. A. McLean.

A resolution was adopted thanking Mills Roberts for his services as a member of the Board of Directors, as vice-president and president of the association as he has been transferred to another territory and will no longer be able to represent the General Telephone Co. of the Southwest in the Rocky Mountain Telephone Association. The resolution expressed regret at losing Mr. Roberts as a member of the association because of his valuable and faithful services.

The 1954 convention will be held September 16 and 17 at the Newhouse Hotel, Salt Lake City, Utah. —

New Leich 700 Telephone Offers Many New Features

AFTER SEVERAL years of development work, the Leich Electric Co., Chicago, Ill., has announced its new 700 series telephones. This new telephone instrument, according to Roy Siemund, president of Leich Electric Co., represents a complete change in design and offers more practical advantages than Leich has ever before incorporated in one telephone.

One of the main features of this new instrument is the new short-coupled handset unit which is responsible for a considerable improvement in transmission. This handset unit is more than ½" shorter than previous model Leich telephones. This places the transmitter much closer to the user's mouth. Comparison tests have been made which indicate that

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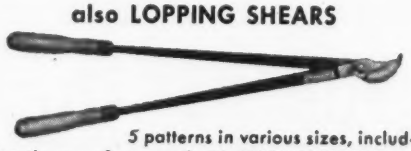

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Leich's new short-coupled handset. This handset unit makes for better transmission because it places the transmitter closer to the user's mouth.

this new handset unit, combined with the high efficiency talking circuit, gives up to 5 decibels gain in transmission over Leich's previous model telephone. The transmitter utilizes standard Western Electric F1 transmitters and HA1 receivers. The new size and shape make it more comfortable to handle and use than the old style handset units.

Another important feature of this new Leich telephone is the flexible circuit design. Spare connections

Leich's 700 Dial Telephone used as a wall model. This telephone uses the same case, same base and same equipment whether it is used for wall or desk installations. The only change necessary to convert the desk model for wall use is to turn the dial around in the case so numbers are right side up.

are used throughout and in this way this telephone can be adapted for every type of service condition generally encountered.

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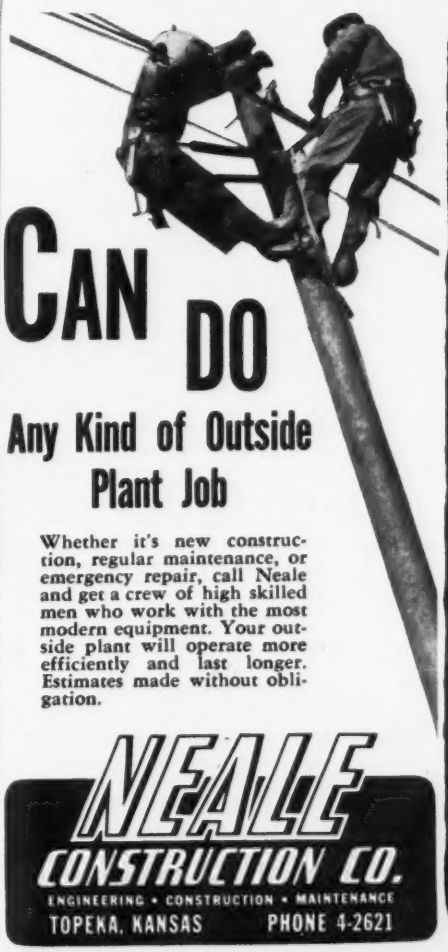

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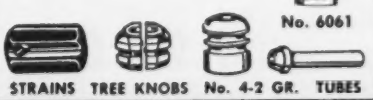

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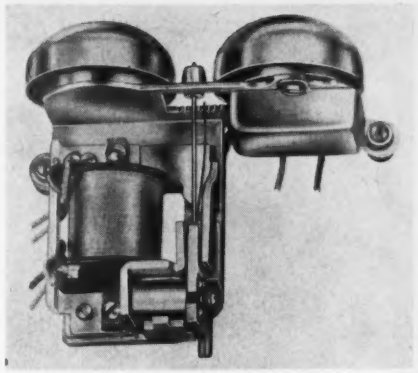

New single coil, high impedance ringer for Leich's 700 Series Telephones.

terchangable telephone whereby the same instrument could be used for wall or desk installation. This practical feature is retained in the new Leich 700 telephone. With the common battery instrument it is not necessary to change, add or buy anything whether the telephone is used for wall or desk installation. Even with dial models it is necessary only to rotate the dial so that the numbers are right side up when the telephone is to be used for wall installations. According to the manufacturer, telephone companies using Leich's previous model telephones have found that this wall-desk idea made it possible for them to stock fewer telephones. They also found it practical because each telephone was right for every installation.

Leich officials state that among the design improvements that make for more dependable operation, one of the most important is the new Leich single coil, high impedance ringer. According to Leich, high impedance ringers draw less current and thus are better for heavily loaded lines. They also reduce noice induction on divided ringing circuits.

The same single coil is used for all ringers regardless of frequency. The condenser is an integral part of the ringing assembly but may be replaced by removing two screws. This ringer is available for every frequency and has several new features which make it easier to adjust in the field should that be necessary.

Considerable improvement was made in the hookswitch to make it operate dependably for long periods of time without any necessity for adjustment. The hookswitch springs are accurately positioned by card type stops to provide a permanent adjustment which will not change in service.

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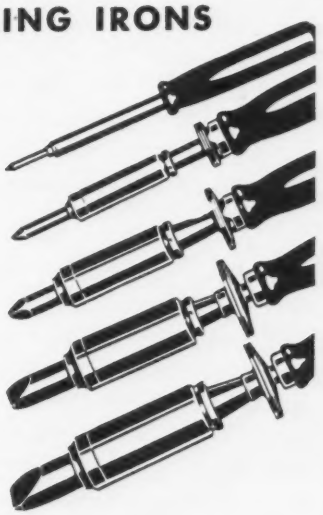

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New Leich Injection Molded Thermoplastic Case will resume original position when pressure is released.

700 instrument utilizes the extended dial ring. In this way the numbers are placed outside the dial. This makes for better visibility, lessens the possibility of wrong numbers and prevents wearing of the numbers themselves.

Another new feature in the Leich 700 telephone is the lift plate which makes it possible for the subscribers to easily pick up the instrument without danger of dropping it.

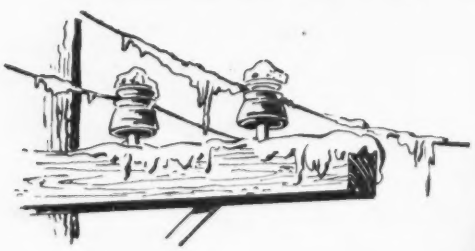
For the first time Leich has gone to the thermoplastic materials in the telephone housing. According to the manufacturer the new Leich injection

Leich's Series Common Battery Manual Telephone used as a wall model.

molded thermoplastic case is very resilient. It will bend under impact or pressure, but will resume its original shape when pressure is released.

The manufacturer states that many improvements have been incorporated in the new Leich telephone to make it easier from the maintenance man's point of view: (1) All parts are readily accessible and may be individually replaced when necessary; (2) the dial mounting bracket makes it a simple matter to change a dial and swings out so that the dial is

WEATHERPROOF!



Cold snaps and sudden thaws can't damage Armstrong's Glass Insulators. Lab tests and field experience have proved they'll withstand thermal shocks far more severe than any you'll encounter on your lines. For details, contact your supplier or write Armstrong Cork Company, Glass and Closure Division, 295 Fifth Avenue, New York 16, New York.

ARMSTRONG'S GLASS INSULATORS

for communications . . . for power

Leich's 700 Series Common Battery Telephone used as a desk model.

instantly accessible for adjustment; (3) since many telephone companies are using ringing tubes in their telephones, mounting space is provided in the base of the Leich telephone for the user's choice of four different types of ringing tubes; (4) the new telephone is available with a hookswitch latch for party line service. This feature prevents transmission losses when other parties on the line listen in and also prevents interference with dial pulsing and is useful for monitoring on reverting call during ringing period.

The new telephones are now being produced in the new modern 50,000 sq. ft. addition which was recently completed at the Leich factory in Genoa, Ill.

A new 12-page catalog has been prepared which gives complete details on the new Leich 700 telephone. Copies of this catalog are available without charge from Leich Sales Corp., 427 W. Randolph St., Chicago 6, Ill.

Mine Safety Appliance Announces New 1st Aid Kits

FIRST AID SUPPLIES of "pharmaceutically controlled quality," in a redesigned case, are reported features of Mine Safety Appliances (MSA) Company's new "Type D" first aid kits. MSA first aid kits are widely used by telephone line crews.

Under a rigid system of quality control, the manufacture and testing of every first-aid item in the kit is traceable back to its origin, with "control numbers" on each package, MSA spokesmen explained.

"This means," they said, "that any first-aid item can be tracked all the

Please Turn To Page 110

ALPHADUCT DROP WIRE

carton packaging

saves you time and money

- easier to handle
- easier to inventory
- stacks neatly, saves space
- saves workmen from injury
- prevents wire from being crushed

Once you start using Alphaduct Drop Wire you will find out that the handy carton packaging has real dollars and cents advantages.

Not only does your wire arrive in perfect condition, but the sturdy carton protects it all the while it's in your warehouse.

The cartons are easier to handle than loose coils. They can be stacked higher without danger of falling and the wire on the bottom will not be crushed or bent. Space is saved, inventory taking is simplified, and the possibility of injuries to workers from tumbling coils is removed.

We try to make Alphaduct the finest, longest lasting drop wire money can buy. Quality materials are used throughout, step-testing during every phase of manufacture assures uniform high standards. Alphaduct drop wire is dated with a color coded thread so you can tell for sure how long it lasts.

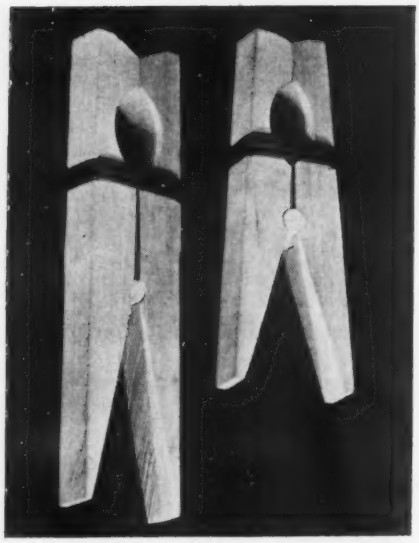
Try Alphaduct Drop Wire

ALPHADUCT WIRE AND CABLE COMPANY • MILLTOWN, NEW JERSEY

NATIONAL DISTRIBUTORS • LEICH SALES CORPORATION, CHICAGO, ILLINOIS

REGIONAL DISTRIBUTORS • PANKEY SUPPLY CO., CHARLOTTESVILLE, VA.

THE LINDSAY TELEPHONE SUPPLY CO., CLEVELAND, OHIO



NEW PRODUCTS' SHOWCASE

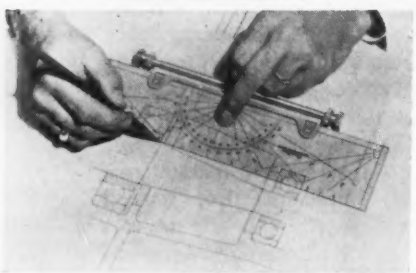
WOOD CLAMP:—A non-metal clamp for linemen's rubber blankets which can be applied easily and quickly yet offers maximum safety protection has been re-designed by the Surety Rubber Co., Carrollton, Ohio, and is now being distributed nation-wide.

The clamp is a modification of an earlier model introduced several years ago by Surety Rubber, and is now being manufactured in two sizes — 7½ inches and 10½ inches — both designed to fit comfortably in a lineman's glove.

Made completely of wood, with the exception of three bands of rubber which furnish the spring action, the clamp contains no metal to conduct current or to interfere with its serviceability. The jaws are of smooth finish, close-grained poplar, and work on a wooden spool fulcrum. The clamp can be ordered with or without a dowel pin on the lower jaw. The pin is made to fit into the blanket holes but many linemen prefer the smooth jaw to permit clamping onto any part of the blanket.

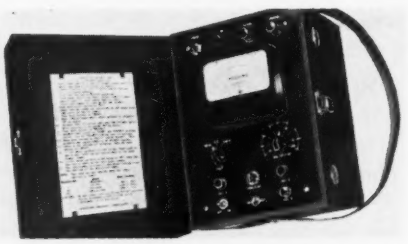
Tension for holding the jaws in place is furnished by three bands for super-aging rubber grooved into the clamp so they cannot slip out of place. Actually, only one band is necessary to hold the clamp in position but the designers of the clamp decided upon three to insure maximum protection. The bands are replacable.

The entire assembly of the clamp can be taken apart for easy shipment or storage. The Jumbo clamp weighs only 5-16 of an ounce and so constructed that the jaw opening can be enlarged by merely cutting the inside of the jaw.—For Complete Data, Check New Product 583.



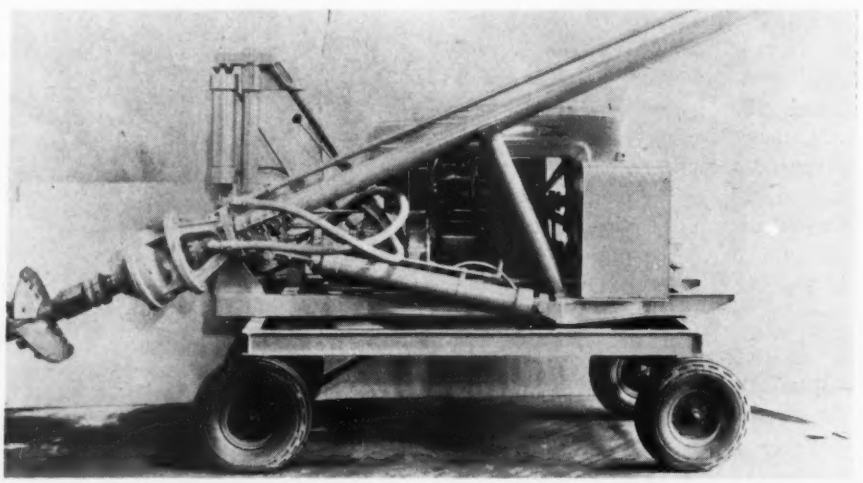
DRAFTING DEVICE:—A new model device that combines the functions of T-square, triangles, straight-edge, scales and protractor, or drafting machine, in one simple unit without adjustments or additional parts. Paraline weighs less than 4 ounces, and is small enough to be carried in the pocket or brief case for use at the office, home, factory, client's office, or in the field. It may be used on any flat surface such as table or desk for ordinary drawings, or to speed-up detail work on very large drawings where drafting machine or T-square are used on the drawing board. Angles and tangents are rapidly projected. Parallels are scaled rapidly without raising the device. It is extremely rapid for cross-hatching. The new Professional Model Paraline measures 12-½ in. x 3-½ in., and is available in either engineer's scale or architect's scale.—For Complete Data, Check New Product 584.

INSULATION RESISTANCE TESTER: — Featuring nine ranges of resistance values from 0.1 to 50,000 megohms at D. C. test potentials of 500, 1250 and 2500 volts, the new Model 272 Vibrotest provides a compact, portable insulation resistance measuring instrument for checking circuits of equipment and apparatus designed for high voltage operation.



The instrument is line powered from 115 volt 50-60 cycle source and output test voltage on all ranges is regulated to 0.1%.

In addition to the "Read" position, panel mounted selector switch provides a "Quick Charge" position permitting operator to bypass output resistor to make full output of 4 milliamps available to more quickly charge



EARTH BORING MACHINE:—The Wyoming Valley Equipment Co., Inc., 1089 Wyoming Ave., Forty Fort, Pa., has announced a new lighter-in-weight but heavy duty in design earth boring machine. According to the manufacturer the machine is built heavy enough to withstand digging holes up to 16" to 20" in diameter, 6 to 7 ft. deep and "do a good job." Reduction in weight has been accomplished by building a new type narrow frame. The power plant is 4-cylinder Ford industrial engine. The width of the machine is 34"—frame length 96" overall. The width and length will allow for certain installations where the digger may be used in connection with line trucks.

Known as the new "Sterling Enterpriser," the unit is ideal for mast of the following jobs:

(1) Telephone Companies which need a 16" to 20" diameter hole—6 to 7 ft. deep.

(2) For mounting on lighter trucks where speed is essential for use on off-the-highway work where heavy equipment could not be used.

(3) For use in rural areas where poles are smaller and where terrain is difficult to drive over.

(4) For the Middle West and in the Plains States. Lightweight but strong construction will have many advantages over larger and heavier equipment.

(5) The original cost is less. The cost of operation is less—the cost of maintenance is less—the cost per hole will be less.

For Complete Data, Check New Product 585.

highly capacitive circuits. This considerably reduces time necessary to obtain readings. After reading, the operator turns selector switch to the "Discharge" position, which de-energizes circuit under test through discharge resistor thereby protecting operator from any capacitive discharge from test circuit.

Other features include transformer — rectifier power supply, "Guard" circuit to eliminate surface leakage effects, and an electronic amplifying circuit to provide high sensitivity in the meter.

Applications include insulation testing of large rotating machines, power cables, potheads, transformers, circuit breakers, large condensers, etc.

Model #272 Vibrotest is furnished in a self contained wrinkle finish welded steel case, size 9¼" x 12½" x 10, with removable cover. Weight is 23 pounds. — For complete data, Check New Product 586.

WIRE STRIPPING TOOL: — The Rockford Wire Stripper Co., Rockford, Ill., has announced a new, improved Wire Stripper with interchangeable cutters for stripping 12 to 24-gauge solid or standard wire, or 300-Ohm twin lead-in wire. The new model is being marketed under the trade name "Whiz Wire Stripper." It is light in weight, with lock-open feature that holds the jaws open automatically so the wire can be removed after stripping without crushing. The jaws are released instantly with a finger tip touch of the lower handle. Check New Product 587.

CHIP RETRIEVER:—The new GS magnet, made of super-magnetic alloy offers lifetime permanence through a single pole magnetic process. Removes chips from blind drill and tap holes on production lines, and in assembly work, both electrical and mechanical. Tool and Die makers will find the unit indispensable in normal shop work. Assemblers and inspectors find the unit useful to test coat of surfaces for magnetic properties of the under material. Check New Product 588.

THE BUYERS' GUIDE

ADVERTISING, Directories — Planning, Selling, Compiling, Producing, Publishing and Distributing — backed up with over 43 years of Directory Experience and Knowledge. Write or call L. M. Berry & Co., Hulman Bldg., Dayton, Ohio.—[ADV. 1]

ADVERTISING, Directories — *General Telephone Directory Co., 604 Pine Ave., Long Beach, Calif., and 1800 Busse Highway, Des Plaines, Ill.*—[ADV. 2]

BELTS — CLIMBERS — COMPLETE LINEMEN'S EQUIPMENT, *W. M. Bashlin Co., Bashlin Bldg., Grove City 1, Pa.*—[ADV. 3]

BELTS — CLIMBERS — PLIERS — SAFETY STRAPS — CONSTRUCTION TOOLS. *Klein & Sons, Mathias. 3200 Belmont Ave., Chicago 18, Ill.*—[ADV. 4]

BOOTHS—Acoustic Telephone — *Sherron Metallic Corp., 1202 Flushing Ave., Brooklyn 6, N. Y.*—[ADV. 5]

BRUSH & WEED KILLERS — *Thompson manufactures many types of brush and weed killers. Write for helpful information on specific problems. Thompson Chemicals Corp., St. Louis 3, Mo.*—[ADV. 6]

CABLE, All Plastic, *Aerial, Duct, Direct Burial, PBX, Switchboard. — The Ansonia Wire & Cable Co., Ansonia, Conn.*—[ADV. 7]

CORDS, Switchboard (with or without plugs), Instrument (retractable and regular) and Operators — *Commercial Cord & Supply Co., Inc., 26 Main St., Clifton Springs, N. Y.* —[ADV. 8]

CORDS, Switchboard & Telephone — *Runzel Cord & Wire Co., 4727-31 Montrose Ave., Chicago 41, Ill.*—[ADV. 9]

ELECTRIC HOT WATER HEATERS. *Thermostatically controlled for any hot water heater, Vulcan Electric Co., Danvers 17, Mass.*—[ADV. 10]

ENGINEER, CONSULTING — *Telephone financing — J. E. Albert, 185 N. Wabash Ave., Chicago 1, Ill.*—[ADV. 11]

FURNACES — For quickly and economically melting lead and paraffin — *Mutual Liquid Gas Equipment Co., Inc., 3600 W. Imperial Highway, Los Angeles, Calif.*—[ADV. 12]

INSULATORS, Porcelain — *Porcelain Products Inc., Box 300, Findlay, Ohio.*—[ADV. 13]

LIGHTWEIGHT PULLERS — *Coffing Hoist Company, 800 Walters St., Danville 5, Ill.*—[ADV. 14]

PIPE PUSHERS — *Giant Manufacturing Co., South 6th St., at 12th Ave., Council Bluffs, Iowa.*—[ADV. 15]

POLE HOLE DIGGERS — *For derrick mounted trucks. Tele-E-Lect Products, Inc., 9613 Minnetonka Blvd., Minneapolis 16, Minn.* —[ADV. 16]

POLES, Southern Yellow Pine — *Colfax Lumber & Creosoting Co., Inc., P. O. Box 23, Pineville, La.*—[ADV. 17]

POLES, Southern Yellow Pine — *Taylor Colquitt Company, 290 E. Main St., Spartanburgh, S. C.*—[ADV. 18]

POLES, Southern Yellow Pine — *Texas Creosoting Co., Orange, Texas.*—[ADV. 19]

PROTECTIVE EQUIPMENT — *Reliable Electric Company, 3145 Carroll Avenue, Chicago 12, Ill.*—[ADV. 20]

REBUILT TELEPHONE & SWITCHBOARDS — *Telephone Repair & Supply Company, 1760 Lunt Avenue, Chicago 2, Ill.*—[ADV. 21]

TRUCK BODIES — *Highway Trailer Co., Edgerton, Wisc.*—[ADV. 22]

TRUCK BODIES AND EQUIPMENT — *McCabe Powers Auto Body Co., 5900 N. Broadway, St. Louis 15, Mo.*—[ADV. 23]

WIRE, Insulated — DATED DROP WIRE — Neoprene or Weatherproof — *Alphaduct Wire & Cable Co., Milltown, N. J.*—[ADV. 24]

WIRE, Insulated Drop and Bronze or Copperweld — *Acorn Insulated Wire Co., Inc., 36 Freeman St., Pawtucket, R. I.*—[ADV. 25]

WIRE, Telephone, *for all inside and outside uses — Whitney Blake Co., New Haven, Conn.*—[ADV. 26]

For complete information on the products and services described in this department send in the coupon which appears on this page. If you do not see a listing of the products and services that you are interested in, write BUYER'S GUIDE, 7720 N. Sheridan Road, Chicago 26, Ill. The information will be furnished quickly and without charge to telephone industry members.

SEND IN THIS COUPON FOR MORE INFORMATION

Telephone Engineer Publishing Corp.
7720 N. Sheridan Road
Chicago 26, Illinois

Please forward complete information on the following products and services described in the December, 1953 issue of TELEPHONE ENGINEER & MANAGEMENT (Check information desired.)

NP 583 NP 584 NP 585 NP 586 NP 587 NP 588

SERVICES AND SUPPLIES

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ADV. 6 ____	ADV. 7 ____	ADV. 8 ____	ADV. 9 ____	ADV. 10 ____
ADV. 11 ____	ADV. 12 ____	ADV. 13 ____	ADV. 14 ____	ADV. 15 ____
ADV. 16 ____	ADV. 17 ____	ADV. 18 ____	ADV. 19 ____	ADV. 20 ____
ADV. 21 ____	ADV. 22 ____	ADV. 23 ____	ADV. 24 ____	ADV. 25 ____

Name _____ Title _____

Company _____

Street Address _____

Town _____ Zone _____ State _____

EMPLOYEES
POSITIONS
SERVICES

THE CLEARING HOUSE

FOR SALE
OPPORTUNITY
EQUIPMENT

Published in each issue of **Telephone Engineer & Management.** Advertising forms close on 1st of month. Rates—15 cents a word except for Situation Wanted ads, which are only 10 cents per word. In figuring cost of ads, count each word of address in number of words used. All ads payable in advance. Minimum charge—$2.00. Special rates for display ads on request. Send copy and box number replies to Telephone Engineer Publishing Corp., 7720 N. Sheridan Road, Chicago 26, Ill.

HELP WANTED

HELP WANTED—Cable Splicer for Class A company. Permanent job. Group insurance, paid holidays and other benefits. Reply Box 8864, c/o Telephone Engineer Publishing Corp., 7720 Sheridan Road, Chicago, Ill.

HELP WANTED: Progressive rapidly growing Southeastern Wisconsin Class B Company needs TWO experienced INSTALLER-REPAIRMEN. Knowledge of dial is desirable. Permanent position, good working conditions, complete insurance program. Advancement opportunity. As company grows, so can you. Furnish age, experience, etc. Write Box 8868, c/o Telephone Engineer Publishing Corp.

CABLE SPLICERS, Equipment Installers, Station Installers, Linemen. Experienced men needed. Steady work, good pay. Henkels & McCoy, 6100 N. 20th, Philadelphia, Pennsylvania.

MANAGER for telephone cooperative wanted. Include education, references, and past employment in replies to Guadalupe Valley Telephone Cooperative, Inc., Smithsons Valley, Texas.

POSITION WANTED

Position Wanted
TELEPHONE EQUIPMENT SUPERVISOR or ENGINEER — Experienced in: Engineering, installation and maintenance of step by step, all relay exchanges and P.B.X. systems. Thoroughly familiar with plant practices. Best of references. Write Box 8867, c/o Telephone Engineer Publishing Corp., 7720 Sheridan Road, Chicago, Ill.

YOUNG MAN, 23, B.S. E.E. next June, desires Engineering position. Familiar with many types of telephone equipment and automatic switching systems. Contact: Donald K. Melvin, 50 Halkin Lane, Berkeley, California.

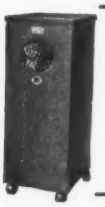
FOR SALE

FOR SALE:—January 1st, 1954 North Automatic Relay Board. Three Hundred lines with all equipment in good working condition. $37,500 worth of equipment. Reason for selling is that we must put in larger board. If interested come look it over and make offer. Mebane Telephone Co., Mebane, N. C.

FOR SALE: Twelve positions of Stromberg-Carlson super service switchboard equipped with 880 common battery lines and five party selective ringing. Available about May 15, 1954. For further details contact: Purchasing Agent, West Coast Telephone Company, Everett, Washington.

COMPLETE CENTRAL OFFICE available January 1954. 633 line common battery Stromberg-Carlson Universal Super Service Multiple Switchboard, new in 1946, Kellogg test cabinet, main frame, relay racks, 320 ampere batteries, chargers, power board, ringing machines, operators chairs. Excellent condition. Price upon request. Write Quincy (Fla.) Telephone Co.

FOR SALE
G N 38 B Generator
Used on Switchboard BD 70, BD 71, BD 72 and Field Telephone EE8
1,000 Brand New at $4.00 ea.
TALLEN CO., INC.
159 Carleton Ave.
Brooklyn 5, New York



ALL SEASON DEHUMIDIFIERS
All temperature, air filtering, humidistat controlled type made in several sizes for unheated dial exchanges in all climates.
Order from jobber or direct.
The H. J. KAUFMAN CO.
13215 Roselawn Ave., Detroit 4, Mich.

FOR SALE—Telephone Exchange. Eighty-six stations. Doubled easily. Sacrifice, account illness. R. Henry, Crook, Colorado.

Rebuilt, Refinished
Loud ringing bells. 1000 or 2500 Ohm @ $8.00 each. With Condensers @ $9.00 Each.
F.O.B. Chicago, Ill.
INDEPENDENT TELEPHONE REPAIR CO.
2137 W. 21st St.
Chicago 8, Illinois

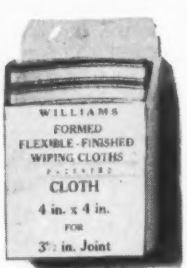
Write Today for Your Copy..

Bashlin's new bulletin giving full details on Linemen's Safety Equipment is ready for you . . . a complete line from which to choose, and every one a champion. Write today!

W. M. BASHLIN CO. **Grove City 1, Pa.**

Cable-Splicers

WIPING CLOTHS



packed in cartons

Formed-flexible finishing cloths; (Patented); Flat finishing cloths; Catch cloths; Crotch cloths and Up-right joint catch cloths. Made of world-prize HERRINGBONE TICKING or imported English MOLESKIN. Write for literature and prices from your jobber or from us.

sealed in wax paper wrappers

GEO. E. WILLIAMS, *Mfr.*
3035 Aldrich Ave., MINNEAPOLIS 8, MINN.

REPEATING COILS

Western Electric

94-E	94-F	95-E	67-C
120-C	120-D	120-E	75-G
120-F	125-A	77-A	25-M

Automatic Electric Co.
D-281932-A D-281686-A

Kellogg
18-A Phantom and Simplex Service

Stromberg-Carlson
#11-A Ring & Talk thru for Toll Service.

Also available many types of line and cutoff relays.

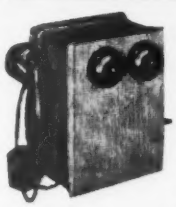
BUCKEYE TELEPHONE & SUPPLY CO.
1250 Kinnear Road Columbus 8, Ohio

PINS AND BRACKETS

Manufacturers of all sizes Locust Pins, Oak Brackets, Locust Bushings. REA Approved.

L. H. WIEBEL, INC.
Charlottesville Virginia

Cedar Poles
THE MAC GILLIS & GIBBS CO.
1615 E. Royall Place, Milwaukee 2, Wis.
Northern White and Western Red Cedar
Creosote and Pentachlorophenol Treatments



MAGNETO WALL
3 Bar. 1000 Ohm. @ $18.00
4 or 5 Bar. 1600 or 2500. @ $20
Prices F.O.B. Chicago, Ill.
INDEPENDENT TELEPHONE REPAIR CO.
2137 W. 21st St., Chicago 8, Ill.

LIMITED SUPPLY (Used) SUBCYCLE RINGING MACHINES
Input, 115-V-AC-60 Cy. Output, 20 cycles.
Small PBX Type ..... @ $30.00
Large Type ..... @ $45.00
Prices FOB Chicago, Ill
Independent Telephone Repair Co.
2137 West 21st. St. Chicago 8, Ill.

SPECIFY
TELERING
for
Dependable and Economical Telephone Ringing Power Equipment.
Engineered for complete satisfaction.
Manufactured by
TELKOR, INC. Elyria, Ohio

U. S. Independent Tel. Assoc. Announces Member Company Employe Retirement Plan

FOLLOWING receipt of a number of inquiries relating to the Pension Plan designed for small companies which has been approved by the U-S-I-T-A Board of Directors, Clyde S. Bailey, U-S-I-T-A executive vice-president last month released the following announcement:

U-S-I-T-A Member Company Retirement Plan

"Each of our member Companies have available to them the Retirement Plan summarized below for its own employes and may appoint its own Retirement Board to administer its plan. Each company would then create a separate trust to fund the benefits under its plan. The Chase National Bank of the City of New York will be Trustee of this trust and will also be Trustee under a Declaration of Trust for the composite investment of the funds of the separate trusts. The Chase as Trustee would not be restricted to 'legal' securities, and would be authorized to invest on a broadly diversified basis which would include common stocks. Each company may at any time withdraw its separate trust from the consolidated fund, except as to the reserves for retired employes which will be pooled for all participating companies. Retired employes will have prior claims against the consolidated fund.

SUMMARY OF THE PLAN:—

"(1) *Normal retirement at age 65—with provisions for earlier or later retirement.*

"(2) *Retirement benefit to be a monthly income for life equal to 1% of the employe's monthly compensation for the last ten years of service multiplied by the number of years of service, reduced by one-half of his Social Security Old Age Benefit.*

"(3) *An employe may elect to provide a benefit for a surviving beneficiary by accepting a reduced retirement benefit for himself.*

"(4) *No benefits except upon retirement.*

"(5) *Employers will contribute the entire cost of the Plan.*

ADVANTAGES:—

"(1) *Composite investment of funds with attendant broader diversification and higher yields.*

"(2) *Lower cost for actuarial and trust services.*

"(3) *Additional security for retired employes from their prior claims against the fund and the pooling of retirement reserves.*

"*For further particulars and details please address: United States Independent Telephone Association, 411-17 Munsey Building, Washington 4, D. C.*"

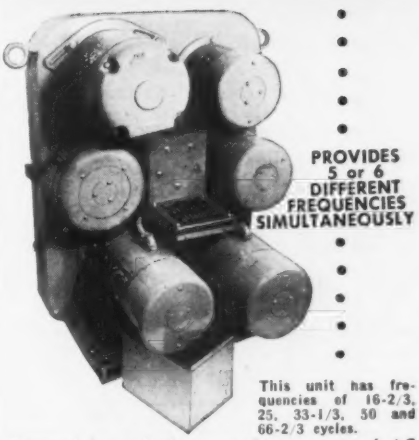
It is believed the above announcement will furnish answers to a number of questions relating to the principal provisions of the plan and the advantages to be obtained from participation in it.

Bogota Colombia, System To Add 65,000 Stations In '54

THE TELEPHONE system in Bogota, the capital of Colombia, will be expanded during 1954 with the addition of central office and plant facilities to serve 65,000 new telephones.

The telephone system in Bogota is operated by the Empresa de Telefonos de Bogota, which is headed by Dr. Argelino Duran-Quintero. With the expansion of plant facilities next year, the number of telephones in operation will be more than doubled.

MEET USUAL SINGLE OR MULTIPLE FREQUENCY REQUIREMENTS WITH
KATO RINGING POWER



This unit has frequencies of 16-2/3, 25, 33-1/3, 50 and 66-2/3 cycles.

Powered by a 3-phase synchronous speed AC motor. Many other frequencies available such as 20, 30, 42, 54, 66 cycles. Also single frequency units. Can be supplied with DC motors. Tone commutators. Coin collect generators.

KATO also manufactures AC Generators 500 watts to 300 kw, DC to AC Rotary Converters, 15 to 400 cycles. Motor Generator Sets. Motor and generators of odd frequencies are a specialty.

Write for Complete Information!

KATO *Engineering Company*

Gray Label Batteries

—— one of the oldest stand-bys in the telephone business—always the standard of highest quality — have been sold by Suttle as far back as we can remember.

Koiled Kords

—— one of the newest products in the telephone business that have proved their merit — a really worthwhile advance — are stocked in all sizes, up to and including the 25-foot extension cord.

Autelco Pay Stations

—— the continuation of the Gray pay station line — a revenue-producing necessity from away back — no substitutes — you'll find all popular standard models in stock at Suttle.

See Your SUTTLE Catalog

Serving Independent Telephone Men Since 1910

Suttle EQUIPMENT CO.

LAWRENCEVILLE ILLINOIS

Concluded from Page 105

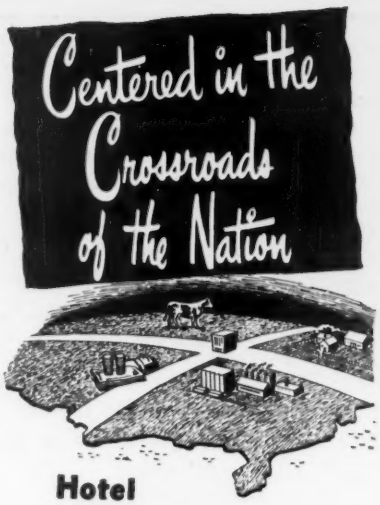
way back to its original source, and guarantees the user the same rigid inspection and control found in the highest quality pharmaceutical products.

The individual Unit "D" packages feature new, simplified, fully illustrated instructions in large,clear type. A new blue color gives both the Unit "D" boxes and the kits a clean distinctive appearance. The labeling meets the latest requirements of the U. S. Pharmacopeia and the Food and Drug Administration.

Visual swabs — one item in the typical assortment of first aid supplies — were cited as an example of the refinements incorporated in the kits. Applicator tips are of gauze, rather than cotton, because gauze has no loose fibers to cling to the wound. Also it is less absorbent and thus allows the antiseptic to be utilized more efficiently. To help the user avoid confusing one antiseptic with another, the labels of each antiseptic are printed in a different color.

Complete details on MSA First Aid Kits may be obtained from Mine Safety Appliance Co., 201 N. Braddock Ave., Pittsburgh 8, Pa. Request Bulletin 0401-2.

Mine Safety Appliances Company's new "Type D All-Weather First Aid Kit" exhibits new design and packaging features, a special color-identification system for packaged materials, and the first-aid items from inhalants to bandages are rigidly controlled to pharmaceutical standards by a quality control procedure whereby every unit carries an identifying key number. Individual Unit "D" packages feature simplified, fully illustrated instructions in large, clear type. A new blue color gives both the Unit "D" boxes and the kits a clean, distinctive appearance. Write Mine Safety Appliance Co., 201 N. Braddock Ave., Pittsburgh 1, Pa., for Bulletin No. 0401-2.



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OMAHA, NEBRASKA

Traditional host to nation-wide travelers, modern Hotel Paxton stands in the heart of Omaha, the crossroads of the nation. Omaha's newest and finest hotel, the Paxton offers modern air conditioned guest rooms, the smart Pax Room for dining and dancing, the beautiful Mural Lounge for cocktails and for delightful dining the charming Tavern Grill and the tastefully appointed Coffee Shop. For better living in Omaha . . . always pick the Paxton.

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ANGELES COURTS.....San Antonio
VIRGINIA
HOTEL MOUNTAIN LAKE...Mountain Lake
HOTEL MONTICELLO.....Norfolk

AFFILIATED NATIONAL HOTELS

STROMBERG | CARLSON

transmitter

Published by the makers of famous XY Equipment

VOL. 2, NO. 9 DECEMBER, 1953

Ring out the Old, Ring in the New at Coos Bay, Ore.

Forest-clad mountains with enormous timber reserves sweeping down to the beautiful and bountiful sea — a land of challenging opportunity where big men bring big plans into reality. The center of this activity is Coos Bay, Oregon, largest lumber shipping port in the nation. Communications — the blood stream of such an economy — are furnished by the West Coast Telephone Company.

This summer 2050 lines and 4900 terminals of Stromberg-Carlson XY dial equipment were cut into service at the Coos Bay central office. At the same time a 22-position No. 3 Type Stromberg-Carlson key pulsing toll board became the toll center for the company's Marshfield District serving 16,180 stations.

Coos Bay now joins the select list of cities which comprise the national intertoll dialing network. All stations in any other office connected to the network can be dialed directly: in addition, operators can dial toll centers in Canada and Mexico through the use of switching codes.

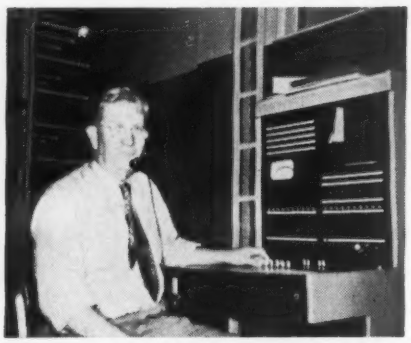
President C. H. Loveland congratulates Marshfield District Plant Superintendent Elmer Dubuque on the cut-over. Left to right: Norman Doving, Wire Chief; Charles Fisher, Engineer, Stromberg-Carlson Co.; Ray Dalton, Vice Pres. and General Manager; Dan Tompers, Equipment Engineer; C. H. Loveland, President; Robert Cole, Marshfield District Equipment Supervisor; Elmer Dubuque, Plant Supt.; George McBride, Marshfield District Mgr.; Arthur Gibson, General Manager, Tel. Div. Stromberg-Carlson Co.; Joseph P. Galligan, Pacific Coast Mgr., Stromberg-Carlson Co.; Peter Nenzel, Vice President, West Coast Co.

An interesting feature is involved on inward toll service to the area. Inward calls reach Coos Bay tributary offices without any handling at in-

Coos Bay toll operating room with information desk. Chief Operator's office in background. 22 positions of Stromberg-Carlson No. 3 toll equipped with keysenders.

Russell Loveland, Vice President; Mrs. George McBride, wife of District Manager; and Dan Tompers, Equip. Engineer, West Coast Tel. Co.

STROMBERG-CARLSON transmitter



Michael O. Burch, Testboardman, 40 years with West Coast Telephone Company and its predecessor company at Coos Bay, tries out the newest panel.

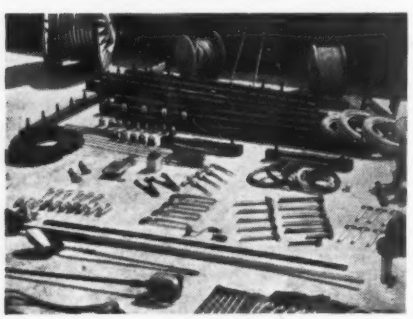
ward positions. Thus, a call can be routed from New York directly to the magneto toll board at Gold Beach by dialing the code for Coos Bay plus the code 247 to automatically switch through Coos Bay. Stations in Oregon and Washington can go as far south as Crescent City, California by this method. It is interesting to note that coordination was necessary between the Oregon Area and the northern California Area, which have independent numbering plans, to make this new method of entering ringdown offices possible.

The toll board is equipped with key senders and also with auxiliary dials at each position. Seven-digit numbering designed to fit into the nationwide numbering plan is also used. The multiple is equipped with idle indicating instead of with busy lamps.

Timber, wood products, commercial fishing, agriculture, and certainly not least, the many tourists and sportsmen attracted to this region assure a steady demand for the excellent modern telephone service made available by the West Coast Telephone Company. Needless to say, this forward-looking company has made adequate provision for the further expansion which may be expected in this region.

Let Us Help You Select Supply Items

By Colby Knapp, National Supply Sales Manager



Most of you have recently received the latest price sheets for the Supply Section of your Stromberg-Carlson Catalog. The complete listing of construction and maintenance items in today's catalog is a far cry from the offerings made in 1895 when Stromberg-Carlson first provided telephone companies with a central buying agency for the multitude of outside plant necessities.

The policy followed by Stromberg-Carlson in its supply business over the years is two-fold: to make it easier for the operating man to obtain what he needs, and to evaluate new offerings by suppliers. Those selected carry a double guarantee — that of Stromberg-Carlson as well as that of the respective manufacturers.

Telephone managers are much too busy to spend time locating suppliers for the more than 5,000 products handled by the Supply Sales Division, let alone investigate their worth. The supply managers — C. J. Reynolds in Chicago, Earl Roesch in Rochester, J. W. Mullin in Kansas City, and P. W. Blood in San Francisco — under the direction of the National Supply Sales Manager, do this investigating and maintain working stocks of most items in their strategically located warehouses. In addition, shipments are made from over 100 factories and warehouses operated by the supply manufacturers.

The sales representatives of each Stromberg-Carlson branch office are at your service at all times to offer advice. They know, as well as you, that a package of fuses or some Nicopress sleeves may be just as necessary as a carload of wire in the business of keeping up good telephone service — the bread and butter of all of us.

MEET W. W. Weedfall

Wallace W. ("Wally") Weedfall is somewhat in the position of having the Mountain come to Mohammed. He has become the newest Stromberg-Carlson manager by staying where he was; his former company has been absorbed as the Setco Division of Stromberg-Carlson, designing and manufacturing Carrier equipment for Independent telephone companies.

Wally's talents have been sought by others many times in the past. His story is hardly prosaic! It sparkles with unusual assignments — operating radio stations in Kansas, designing and building radio studios, electrical layouts for 15 new theaters in Paramount's Texas chain, research associate on high altitude articulation at Harvard's Cruft Laboratory.

Unusual places, too — Mexico City, and many other stations in Central American countries installing point to point radio links for railways, airlines, mines and processing plants.

In 1948 Wally became chief engineer of Southern Electric and Transmission Co. in Dallas. When this became the Setco Division of Stromberg-Carlson, he was appointed general manager.

Wally is widely known through his active membership in associations such as the American Association for the Advancement of Science, Institute of Radio Engineers, Petroleum Electric Supply Association, Association of American Railroads, and Telephone Pioneers. He is a registered professional engineer in Texas.

Married in 1928, the Weedfalls have one son, 24.

Wally's many friends will welcome this news of his advancement in the field of his specialization.

STROMBERG-CARLSON transmitter

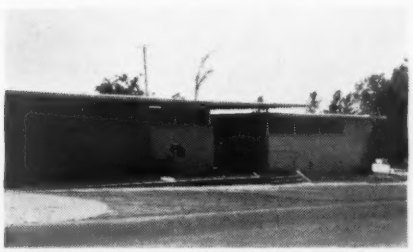
Postman's Holiday

No. 3 - Henderson, Nev., to Brookings, Ore.

By George Forbes, Technical Publications Editor

Hershel Trumbo took a chance at *Henderson, Nevada.* Or was it more a matter of courage and faith? This magic city has awakened from sleep to a virtual bonanza. You might almost say that the ones behind the telephone company have revived the city to provide themselves customers. and now wonder if they have planted Jack's Beanstalk.

The Trumbo's took time out from revising their XY line requirements

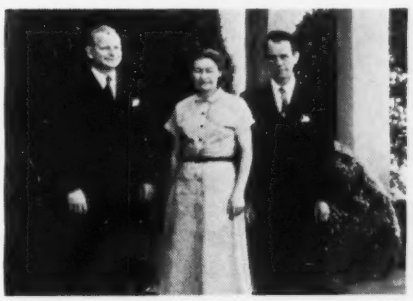


Henderson, Nev., — Different, practical, beautiful

upward to share their home and the strikingly beautiful telephone building; then we joined the Yurgas to explore the sights (and dangers!) of fabulous Las Vegas.

Notice the roof on the telephone office, believed to be the world's first pre-stressed lift slab building. It was poured in two immense slabs *on the floor*, then jacked into place and the walls laid up. Construction engineers came to scoff and left to copy this unique cost-saving technique.

We will always be glad we followed Tommy Thompson's advice to see Death Valley. Plunging down below sea level shortly after sun-up. we were overwhelmed with the naked loneliness. No animal or human being — you speak in whispers, and keep one



John Evans; Virginia, Ver Dayne Williams

eye fixed on the instrument panel even as you think of pioneer bones still bleaching in the drifting sands. Emerging at Lone Pine, dominated by snow-capped Mt. Whitney, the contrasting wonders of our country are pointedly brought home.

Disregarding the warning of the auto club, we entered Yosemite from the east over Tioga Pass. Peaceful beauty camping and climbing in the snowy High Sierras, then down to the Valley for the awe-inspiring waterfalls and less inspiring hoards of visitors — I am sure John Evans understood why we were late arriving at *Patterson, California.*

Just as the agriculture has been revolutionized by irrigation to yield bountiful harvests, so with the Evans Telephone Company: a new XY plant provides the type of service a progressive community expects, yet permits the managers time for other civic duties. John Evans is also mayor; his sister Virginia Williams divides her time between telephone business office and county president of the Federation of Republican Women. Ver Dayne Williams superintends plant operation and doubles with John as funeral director. We'll long remember our pleasant evening in the patio, with Mrs. Evans as gracious hostess.

To have only an afternoon and evening in *San Francisco* was really heartbreaking. Joe Galligan welcomed us to the Stromberg-Carlson office, then "Suzi" Jacobs took us on the boat trip around the bay. For uninhibited fun we recommend the famed cable cars. Dinner in Chinatown; a quick browse through the importers' shops, with all the gifts of the Orient spread before you; a short night. then north through Redwoods to *Laytonville.*

Gil Snyder showed us Laytonville exchange.

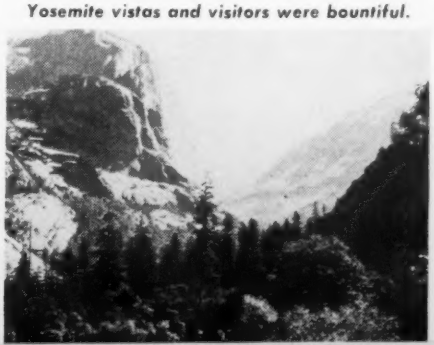
Gilman Snyder flies over the "hump" to his several exchanges (minutes instead of hours on tortuous mountain roads). His several XY exchanges are a-building, but the big news is his projected East-West hookup, eventually to form the first and only cross link between Oakland and the Oregon border. Until this is in operation, a break in either the Coastal or Valley cables would isolate most of Northern California.

The Redwoods must be seen to be appreciated. Wise conservation has preserved all groves bordering the highway; these 300-foot giants meet overhead so that one is wafted into dreams of silvan solitude until jarred back to reality by the roar of a logging rig.

Succulent seafood on the fish pier at Eureka, then the incomparable beauty of the Pacific highway. Many miles and too few hours away was George McBride's impressive new office at *Coos Bay, Oregon* which we will visit next month.

Altitude Zero and still going down

Yosemite vistas and visitors were bountiful.



Logging Redwoods in Northern California.

STROMBERG-CARLSON transmitter

Multiple Digit Adding XY Selectors (used with 2-5 Numbering)

by W. W. Pharis, Circuit Design Engineer

Nationwide intertoll dialing requires that each office included in the intertoll network be assigned an office code consisting of two letters and one digit.

The office code is followed by four digits necessary to establish a connection to a called line, thus giving a total of two letters and five digits in each subscriber's number. It is highly desirable to arrange the local switching equipment in each office so that subscribers as well as intertoll operators may dial the full directory number, consisting of the first two letters of the assigned office name plus five digits. This type of numbering is often referred to as "2-5" numbering.

Digit adding most economical

When 2-5 directory numbering is used in an office, provisions must be made to absorb the two letters and usually the first digit in the local switching equipment. This may be done by providing an additional rank of selectors for each digit to be absorbed. However, this would be uneconomical from both equipment and space standpoints. A better method is to provide multiple digit adding in one of the ranks of local switches, usually the local first selectors. Multiple digit adding may also be required in the incoming selectors in some cases.

A series of multiple digit adding selector circuits have been designed for use in XY dial offices to provide for 2-5 numbering without the addition of any ranks of selectors in most cases. These selectors make use of the universal XY switch with its auxiliary wipers and banks used for level marking. The XY multiple digit adding selector can be arranged to absorb any combination of two letters and one digit in an office code. Certain combinations of office code letters and digits may require slightly more complicated selectors than others. The simplest combinations of letters and digits is one in which the last digit absorbed is different from any preceding digit.

Incoming selectors for XY dial offices may also be arranged for multiple digit adding. It is seldom necessary to absorb all letters and digits of an office code in incoming selectors since one or more of these letters and digits may be used in other offices or the office code may not be dialed as in the case of calls from a toll operator.

How it works

The multiple digit adding selector used in the majority of XY dial offices requiring 2-5 numbering is one which is arranged for use with an office code having the last digit to be absorbed different from any preceding digit. Fig. 1 shows the schematic of the digit adding part of a selector circuit which can be used with this type of office code. The X and XX banks in this schematic are shown wired to absorb the office code MAin-7 or the equivalent. In addition levels 8 and 0 are shown wired for trunks to be reached by a single digit. Assuming that a calling party dials another local subscriber, MA-7 must be absorbed in this selector.

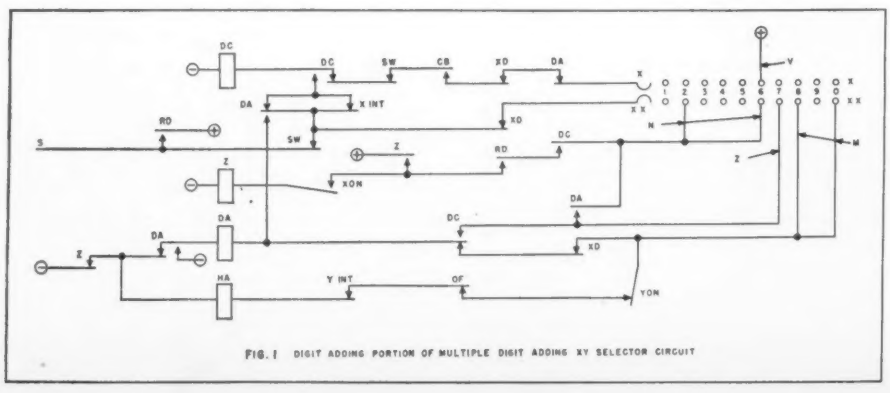


FIG. 1 DIGIT ADDING PORTION OF MULTIPLE DIGIT ADDING XY SELECTOR CIRCUIT

Fig. 2 is a photograph showing the X and XX wipers engaging the X and XX wire banks. When "M" is dialed the X and XX wipers are stepped into their associated banks to the sixth bank wire. The XD relay which is operated from seizure to the end of the first digit restores and operates relay DC which causes the shaft and wipers to restore to normal where the Z magnet releases and relay XD reoperates. Contacts (not shown) remove dial tone. Dialing the letter "A" steps the X and XX wipers to the second bank wires where a circuit is again completed to the release magnet Z when relay XD restores to release the shaft as before.

The digit 7 steps the X and XX wipers to the seventh bank wires. The release of relay XD at the end of the pulsing closes a circuit to relay DA which operates and completes another circuit to the release magnet Z to restore the wipers to normal. The next digit dialed will again step the wipers. Relay DC is released on the first step in the X direction by the X interrupter contacts to unlock all levels to permit the switch to cut-in on any level and complete a connection to a succeeding switch by the operation of relay HA at the end of the digit. Relay HA completes a circuit (not shown) to the Y magnet. If digit 8 or 0 has been dialed instead of MA-7, the XX wiper would have completed a circuit to relay HA to cut the switch into that level without digit absorption. If any letter or digit other than M, 8 or 0 had been dialed as a first digit, parts of the circuit not shown would have applied busy tone to the calling line. By connecting ground to the X bank wire of level seven it would have been possible for a calling subscriber to dial either the full office code MA-7 or only 7 plus the remaining four digits of a called subscriber's number.

Adaptable to special uses

Occasionally due to unusual trunking and office codes it may be necessary to provide either single or multiple digit adding in second selectors.

This is sometimes required when several levels are needed for extended area or free service trunking.

Often an XY dial office is part of a network of dial offices which are interconnected by extended area or free service trunks and in which universal numbering is required. With universal numbering any subscriber must be able to call any other subscriber in the network by dialing the directory number without special directing digits. In assigning the multiple digit adding selectors to such a network, the office codes of each office in the network must be considered. In many of these networks the simplest multiple digit adding XY selector may be used. Other offices may require slightly more elaborate selectors.

Eleven levels possible

One very interesting and useful selector for use in a network with universal numbering is arranged for 2-5 numbering and has eleven effective levels. To provide eleven levels, the normal level is equipped with banks. This level may be reached by dialing any one of several digits causing the wipers of the selector to step in the X direction, drop back to normal and cut into the banks on that level. The digit dialed to reach the normal level may be preceded by another digit which is absorbed. This type of selector is useful when a single group of trunks must be accessed by several different digits or codes because of tandem trunking. Since this is a multiple digit adding selector, the dialing of the local office code will "unlock" those levels corresponding to digits used to reach the trunks on the normal level. It can readily be seen that two or more selector levels are made available for local use which would otherwise be used up with an ordinary selector.

Handles any standard code

Many other types of multiple digit adding selectors are available, or can be made so, to take care of special situations in XY dial exchanges. One of these special types is arranged to permit a level to be used for single digit trunks if dialed as a first digit but absorbed if dialed as the second letter or first digit of a local number. Another of these special types permits the digit corresponding to the first or second letter to be the same as the first digit of a 2-5 number.

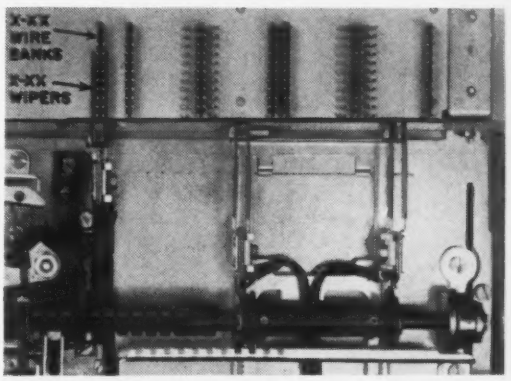


Fig. 2. Part of XY Switch — X and XX wipers engage the X and XX Wire Banks as Switch steps in X direction.

It can be seen from the above that multiple digit adding selectors can be made for XY dial offices with 2-5 numbering which can take care of a multitude of situations. One standard type has been developed to take care of the majority of offices but variations of this type are available, or can be made, to take care of most of the remaining offices without the necessity of additional ranks of selectors, registers, senders, and without the use of additional mounting space. This results in considerable savings in space, equipment and maintenance.

Junction City, Kansas—Good Planning Pays Off

Robert J. Fegan and Thomas B. Fegan had made careful, thorough plans for bringing dial telephone service to the subscribers of their Junction City (Kansas) Telephone Company. Last summer, they were coming down the home stretch.

The financing had been well handled — 25-year 4½% bonds were snapped up quickly — and the company had constructed a new building to house the equipment. Finally, on September 5 at 10:06 P. M., 2,500 lines (5,000 terminals) were cut over to Stromberg-Carlson XY Dial.

The cutover was quick and smooth — it took only 7 minutes. To Bob and Tom Fegan, local officials, newspapers and businesses paid great tribute for their excellent management and foresight.

Portion of the XY Equipment room in new office at Junction City.

Very important to the operation is the 20-position Stromberg-Carlson toll board.

(L. to r.) T. B. Fegan; Maj. Gen. T. L. Harold, making first call to nearby Ft. Riley; and R. J. Fegan.

STROMBERG-CARLSON **transmitter**

XY in the news

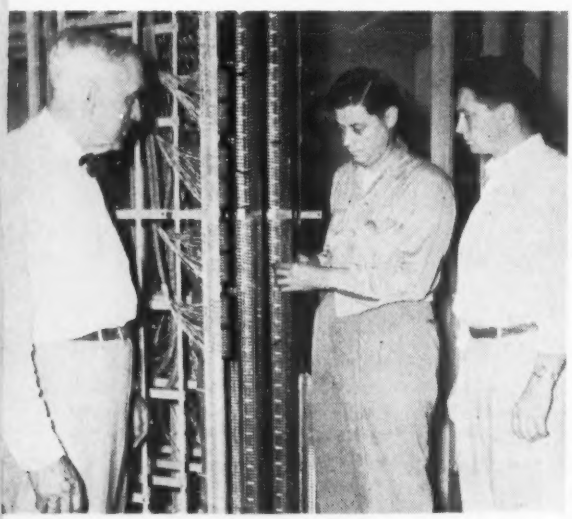
Yorkville, Tenn.

When Congressman Jere Cooper, of Tennessee, called REA Administrator Ancher Nelson on September 16, the new XY system at Yorkville, Tenn., was officially cut over. The congressman's call was the first long distance call over the new system.

W. F. Jones, president of the Yorkville Mutual Telephone Co., celebrated the event with a barbecue dinner and program. Besides Congressman Cooper, honored guests included Walter L. Wolff, head of Southeastern Area. Telephone Loans Division of REA, and Jesse Safley, Farm Editor of the Nashville Banner.

Yorkville cut over 110 lines; the conversion was trouble free and very successful.

Hillsdale, N.Y.



Left to right, John D. Ackley, Vice President of the Copake Telephone Co.; Cecil L. Blass, plant manager; and J. Ben Ackley, President, examine their 180-line XY equipment at Hillsdale exchange. Cutover was made last summer, first of the company's four exchanges to convert to dial.

Hawkins, Tex.

Left to right: C. R. Dowd, owner of Hawkins Telephone Co.; A. B. Preble, manager of Stromberg-Carlson Kansas City office; and Milton Dowd, in room housing XY equipment which was cut over early this year. Hawkins, Texas is located in Wood County's richest oil field. Since purchasing the company in 1946, the Dowds have added 25,000 feet of cable, extended rural lines up to 15 miles, installed a modern 2-position switchboard, and in 1953 converted to XY dial.

St. Jacob, Ill.

When XY dial was cut over on September 3, Home Telephone Co. of St. Jacob, Ill., owner Roland Schmidt happily marked another milestone in his company's progress.

Writes Mr. Schmidt: "This company was started by four men in this town of 550 in 1906. One farmer 6 miles out was the first subscriber and was the only farmer connected for a year. In connecting his phone the lineman fell off a pole and lay at the farmer's house for 6 weeks with a broken leg.

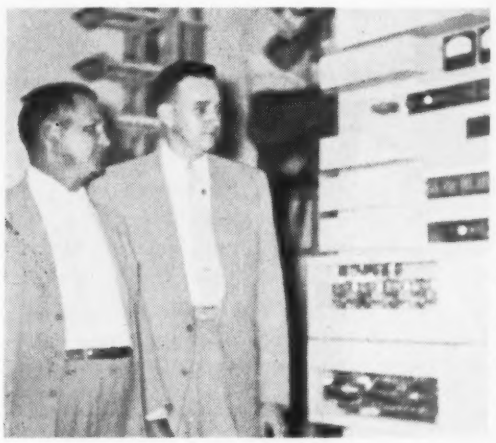
"The company soon sold to one man and for the past 27 years I have owned and operated it.

"The cut was made September 3 and all is working well. All rural lines have new copperweld line wire and all drop was replaced. Two cable leads run out in the country 1½ miles. The underground cable, 34 years old, is buried in sand and is as good as when put in . . . "

Bristol, Fla.

Cutting over 100 lines XY was the occasion for special celebration at Bristol. Principal speakers were Joe Sharit, president of the Telephone Company, Railroad Commissioner Wilbur C. King, and former State Rep. Glenn Summers.

Jack Harrell, of Bristol, received an ovation for his many years of campaigning to bring dial operation to his community.



Howard McKinnon, Supt. of the Bristol, Florida, exchange of the St. Joe Tel. and Tel. Co., inspects new XY equipment with Arthur Beam, Stromberg-Carlson sales representative (at right).

Bangs, Tex.

Thanksgiving came 3 days early in this Texas city as November 23 marked the cut-over of its telephone exchange to XY Dial. Turkeys ordered by dial telephone were noticeably more tender and flavorful; Present at the cut-over were John D. Allen, Division Manager; H. N. Hammond, Plant Superintendent; W. F. Davidson, Equipment Engineer; C. R. Lee, Traffic Superintendent; and Herman Graves, Maintenance Supervisor — all of the Southwestern States Telephone Co. — as well as prominent citizens of Bangs.

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THE BACK OF THE BOOK

BY JOHN G. REYNOLDS

The Holiday Rush

THE CHRISTMAS period, especially Christmas Eve and Day, does some funny things to the nationwide Long Distance lines. And industry members turn things upside down to handle the calls — with all available operators at their posts to help with the load of holiday messages.

Come the Yule-tide and just about everybody gets the natural and happy urge to call Mother, and Uncle Joe, and Aunt Margaret to say "Merry Christmas." With calls going to several thousand other places, large and small, the industry must make some very special plans for the holidays.

The Long Distance network is a web interconnecting this whole land. It was designed, however, for the busy communication needs of the normal day — of business, Government, friends, families. At Christmas, though, people in uncounted numbers call people they rarely talk with at any other time.

For normal needs, engineers study past records and find, let's say, there's an average of a call every two days from New Brunswick to the Albuquerque area. "No need of direct circuits," they agree. "We'll arrange intermediate switching." At Christmas, lo and behold, they get maybe 10 or more Albuquerque calls! The same thing happens *from* scores of other places *to* scores of other places.

So, just before Christmas, telephone companies do a wholesale reshuffling of Long Distance switching arrangements to meet a one-day need that is wholly different from a business day. Even so, some delays just can't be helped.

(P.S. — this year suggest to your subscribers that they try calling on Sunday, December 27, to avoid the certain Christmas traffic jam. And remind them to call by number — lots faster that way.)

Minutes For Profit

RECENTLY a utility company figured out what happened to an eight-hour working day — from the standpoint of how long it took to earn enough money to pay its bills.

The biggest slice out of each working day went to pay wages and salaries. It took from 8 A.M. to 10:53 A.M. to take care of the employe payroll. Earning the money to buy materials and services took a long while, too — from 10:53 to 2:35 P.M., with time out for lunch. To pay for coal, purchased to resell to others, it required one hour and 18 minutes; from 2:35 until 3.53.

Meeting the company's tax bills was a considerable item, taking from 3:53 to 4:19 — 26 minutes. Paying for wear and tear on equipment and paying interest on money the company borrowed to make improvements took another 23 minutes. It wasn't until 4:42 P.M. that the company had earned enough to pay all its bills.

That meant that only 18 minutes of the day were left in which to make a profit. With such a slim margin, it's obvious that the company has to cut all waste and operate at top efficiency in order to keep going.

Party-line Hens

SUBSCRIBERS on a rural telephone line recently protested to the Rochester (N.Y.) Telephone Corp. that "a couple of old hens tied up the line nearly the whole day."

Repairmen sent to investigate found the complaint was apparently accurate. The receiver was off the hook on a telephone extension in a garage.

On a ledge near the telephone were two eggs.

Business Forecasters

THE U. S. DEPARTMENT of Commerce has devised a formula for predicting the future volume of business. Quite simple, say they. Prognosticator needs only to know population of country for any given period he wants to figure on. Statisticans figure one birth every 9 seconds, one death every 21 seconds, one immigrant arriving in country every 2 minutes, one emigrant leaving country every 7 minutes. This adds up to a population increase of one person every 13 seconds. On this basis, in 1975 there'll be 25 per cent more people than in 1950. More people equal more business. No mention of whether the business would be good or bad. Just more business.

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